On the Lion Harbour and other Harbours in Miletos: recent historical, archaeological, sedimentological, and geophysical research*

HELMUT BRÜCKNER, ALEXANDER HERDA, MARC MÜLLENHOFF, WOLFGANG RABBEL & HARALD STÜMPPEL

Καλοὶ δὲ Μιλησίων εἰσὶ λιμένες
“But beautiful are the harbours of the Milesians”
(Chariton, Chaireas and Kallirhoë 4.1.5)

1. Introduction

The Lion Harbour was Miletos’ most prominent harbour during antiquity. It can be envisaged as the heart of the Ionian metropolis in western Asia Minor. Originally situated in a bay of the ”(I-)Karian Sea”, Miletos is now fully incorporated into the plain of the Maeander river, today’s Büyük Menderes.

In this article we combine results from historical and archaeological research with those from palaeo-geography and geophysics. This geoarchaeological approach offers new insights into the dynamic evolution of the harbour basin from the time of the marine transgression in the early Bronze Age (c. 2500 BC), when the area formed part of an island, until its final siltation by the sediments of the river Maeander c. AD 1500.

The Lion Harbour’s outstanding significance is clear from its strategic role as one of the closable war harbours of Archaic and later times. Its central position in the Archaic insula street grid, lining the agora and the main city sanctuary of Apollo Delphinios, made it a gate through which, so to speak, gods and humans entered the city; it was also the point from which Milesians left the city to start their sailing seasons or found their many colonies. The Lion Harbour is likely to be identified with the “Harbour of Dokimos” mentioned by the 1st century AD novelist Chariton (Chaireas and Kallirhoë 3.2.11)

The commercial relevance of the Lion Harbour, however, was quite limited in antiquity. Miletos had a series of other harbours that fulfilled this function: the Theatre Harbour is perhaps the oldest of Miletos’ harbours; it also served as a closable harbour in Geometric-Archaic times. Other important harbours are the Humei Tepe Harbour

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and the Eastern Harbour at the eastern fringe of the peninsula; one of them, most probably the Eastern Harbour, should be identified with the *emporion*, or commercial harbour, where the slave market was located. Together, this quartet might be equated with the four harbours of the city Strabon mentions (*Geographica* 14.1.6). Finally, there are the Athena and Kalabak Tepesi harbours, both of only minor importance. An overview of the evidence for all these harbours is given at the end of the article.

### 1.1 The setting (H.B. & A.H.)

The spectacular view from the German excavation house in Akköy reveals the natural setting of Miletos (Fig. 1).

Towards the north, behind hills and fields, lie the ruins of this famous ancient city, the "ornament of Ionia," with its prominent Hellenistic-Roman theatre, situated at the southern flank of the Maiandros valley (modern Maeander, Büyük Menderes). The river’s extended floodplain dominates the middle ground. In the background, the limestone mountain range of the Mykale (modern Dilek Dağları, formerly Samsun Dağı) reaches nearly 1300 m asl. (above mean sea level). Towards the east, the granite massif of the Latmos Mountains (modern Besparmak Dağları), rises up to 1332 m asl. Lake Bafa, at its foot, is the brackish remnant of the formerly marine Latmian Gulf.²

The Lion Harbour was the most prominent harbour of Miletos from the Archaic period onwards. Since early

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1 Herodotos 5.28: "τῆς Ἰωνίας πρόσχημα".

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Fig. 1. Miletos seen from the German excavation house in the south (Akköy). The Hellenistic-Roman theatre with the Byzantine-Turkish castle on top is situated on Kale Tepe. The Lion Harbour lies in the natural depression between this little hill and the one to the right (Humei Tepe). The floodplain of the Büyük Menderes valley in the middle ground occupies the area of the former marine embayment (part of the "(I) Karian Sea"). The mountain chain of the Mykale is visible in the background. Photograph: H. Brückner (28 August 2010).
Hellenistic times it likely had the name λιμήν ὁ Δοκίμου, the “Harbour of Dokimos”. One of the reasons for the harbour’s importance is its natural setting: it lies in a deep indentation between two limestone hills of the so-called Nergiz Tepe Formation, an outcrop at the southern flank of the Büyük Menderes Graben. Its U-shaped form with a relatively narrow opening that could be closed, its great depth of more than 20 m that prevented it from early siltation, and its stable flanks made it an ideal anchoring ground (Figs. 2-3).

The “Lion Harbour” owes its modern name to two marble lions guarding its entrance and greeting the incoming ships. They are, besides the grave lions of Amphipolis and Chaeroneia, the largest Greek lion sculptures known to date.6

The lion was the holy animal of Apollo, the main god of Miletos. From Archaic times onwards a reclining lion, and from the 4th century onwards a standing lion, facing the front of the southeasternmost gate of the Milesian A late Archaic statue of a reclining lion was relocated to grave markers are especially frequent in Miletos (Fig. 4).7 Lion sculptures as dedications to Apollo or as Roman emperor Trajan in AD 101; it is consequently called the “Lion Gate”.8 Lions protecting city gates are a longstanding tradition in Asia Minor as well as in Greece, going back to the Bronze Age. The Lion Gates of the Hittite capital Hattusa-Boğazköy and those of Mycenae are both well known.

Today, both Milesian harbour lions are partly buried in the ground. The western lion is broken into two pieces and strongly weathered (Fig. 6). The nearly complete eastern lion (Fig. 7) was first unearthed fully by Theodor Wiegele in 1900, then again in 1993 by Volkmar von Graebe. The latter was the first to recognise that both lions date from the late Classical period (the second half of the 4th century BC).9 The eastern lion is 4.00 m long, 2.20 m tall, and weighs about 23 tons.10 In the late 1st century BC or early 1st century AD, a metric inscription was placed on its right shoulder and breast by the epimeletes Sophilos, who was in charge of the harbour. It clearly hints at the use of the lion as the badge of the Milesian mint. Lines 3-9 read:11

\[
\text{οὐνικὰ ἐν ἀλαφυρὸς εἴδους ἄπο} \text{ τοῦ ἐχιρά χήθη[ν],}
\]
\[
\text{εὔσεσμων τεύγας πᾶν τὸ} \text{ νόμιμω σῶλος.}
\]
\[
\text{βαῖν ἓ ἄρχιμα[ς] [ὑ]πὸ} \text{ μίλιτος τύπος} \text{ ἀλ· ἀρετᾶς μοι}
\]
\[
\text{Μίλιτις ὀς γετέρον ἀν ἄ} \text{το ἔδωκε χάριν.}
\]
\[
\text{ὁ Ἀρχαῖας ἔπιμεληταὶ} \text{ τοῦ Δοκίμου} \text{ ἐν �杄 ὀργαν.}
\]

2 Strabo 14.1.8 p. 635: “Ἀττικῶς Κόλπος”. The ancients used the name “Latmian Gulf” to designate only the small embayment at the northwestern foot of the Latmos Mountain, where Herakleia-Latmos was located. This is evident in Strabo’s description of Ionia (14.1.1-10 pp. 624C–647C), which runs from south to north, with the Milesian Peninsula and Miletos. After Miletos he continues along the coast to the east (Strabo 14.1.8): “Afterwards follows the Latmian Gulf, which at the location ‘Herakleia under Latmos’, a small city with an anchorage.” (ἐξ ἐδώκε ὁ Ἀρχαῖος κόλπος ἐν ὑπὸ Ἡράκλεια ἤ ὑπὸ Λατίμου λεγόμενην, πολύν γορυμόν ἔχον’). The bay of the Maeander mouth (Strabo 14.1.9, 12: ἐξὸς λαμπάδος τοῦ Μαιανδροῦ) was instead part of the “Karian (or Ikarian) Sea”: Herda 2009, 43-4 n. 106, 45 fig. 3.

3 Chairas and Kallirrhoē 3.2.11; see below, § 3.1.

4 Schröder et al. 1995, 239.


9 Wiegand 1910, 7-8; von Gerkan 1935, 49-50 fig. 28.

10 Wiegand 1901: 197 fig. 6; for both lions see Kleiner 1968, 6-7, figs. 6-7; Kleine 1980, 61-2 fig. 25; von Graebe 1996.


12 Herrmann 1997, 9-11, 197 no. 188. The inscription is badly preserved, and some parts are missing, including the beginnings of lines 1-5. We follow the reconstruction of lines 3-7 by W. Crönert, (SEG X19, 423); reprinted and translated into German by Herrmann 1997, 197, as well as the reconstruction of lines 8-9 by A. Rehm, reprinted by Herrmann 1997, 10 and translated into German, Herrmann 1997, 197. For the office of the epimeletes as “inspector” of the Lion Harbour see Kawerau & Rehm 1914, 307-12; Herrmann 1997, 174 on no. 140.31-2, 46-7, 60-1, a treaty between Miletos and Kretan cities of 260-220 BC, mentioning ἐπιμελητη τοῦ ἔμποροι, “inspectors of the commercial harbour”; see below, § 4.6.
Fig. 2. The Lion Harbour (“Harbour of Dokimos”?) viewed from the Byzantine castle on Kale Tepe. Above: the seaward part of the harbour with the earth dam at its entrance; this was erected in 1984/85 against the regular flooding of the river Büyük Menderes (Maianodros, Maeander) and followed the presumed course of the ancient moles at the closable harbour entrance. Below: the landward part of the harbour is covered by excavation spoil. In the middle ground to the right: area of the Delphinion (sanctuary of Apollo Delphinios), the Selçuk Baths, and the so-called Ionian Hall (building with columns) at the Processional Road. Photographs: H. Brückner (1 October 2008).

Σώφιλος ἐπεμελήθη.

Hence I was artfully minted in this appearance and so created a coin for this city, easily recognisable, a small copy of my former might. But for my courage, Miletos granted me another favour. For after I had given up raw meat in the mountains, I lie here now, a guard for the public harbour.

Sophilos was epimeletes
Indeed, this very lion is depicted on some Milesian bronze coins of the 3rd to 1st centuries BC, together with another famous Milesian sculpture, that of the so-called Kanachos-Apollo in Didyma (Fig. 8).  

13 Deppert-Lippitz 1984, 118-20, 193-6 catalogue nos. 941-1028, pls. 30-2 (Deppert-Lippitz (1984), 118 dated the coins 39-17 BC, but see the commonly accepted correction of Marcellesi 2004, 49, 123, 125-6, 128, pls. 2-3 on no. 38 [late 3rd century BC] and 56 [late 2nd/early 1st century BC]). For identifying the reclining lion on these coins with the eastern harbour lion see my comments in Brückner et al. in press, § 2.
We learn from Strabon that Miletos had four harbours during the first half of the 1st century AD (see §§ 3.1, 3.4). Like all the other harbours of Miletos, the Lion Harbour has now silted up entirely. Before the erection of an earth dam at its former entrance in 1984/1985, it was regularly flooded by the river Maeander in winter; even during summer it was mainly a muddy area, since the groundwater table is always high. Therefore, no attempts have been made to excavate it; instead, during the early excavations under Theodor Wiegand it was used as a dump for excavation spoil (Figs. 3, 4 & 6).

From a geoarchaeological point of view, the Lion Harbour is an excellent geo- and bio-archive. For this reason sedimentological and geophysical research has been carried out over several campaigns in the last two decades. Excavations at the Lion Harbour might reveal many archaeological surprises, similar to those revealed during the excavation of the Theodosian Harbour in Konstantinoupolis-İstanbul, built in the late 4th century AD, where 37 shipwrecks have been unearthed to date. The authors of this article hope that the Roman harbour of Ephesos, which is supposed to be re-opened for touristic boat travel in the future, will be excavated with the same care, appropriate for this kind of cultural monument.

### 1.2 A short history of Miletos (A.H.)

Due to its setting on a c. 250 km² peninsula protruding into the “Ikarian” or the “Karian Sea”, and its natural protection against invaders from the hinterland by the 400 m high Grion Mountains to the southeast, Miletos was always an attractive place to settlers. The first ones arrived in the late Chalcolithic period (the second half of the 4th millennium BC, Miletos I). Their indigenous Microasiatic culture already shows contacts with and influences from the late Neolithic culture of the Cycladic Islands. From the beginning, Miletos was located at an intersection of trade routes: east–west, connecting the Microasiatic hinterland with the Aegean via the Maeander valley, and north–south, from the Propontis and the northern Aegean Sea to southern Asia Minor, Cyprus, and the Levant (Fig. 9).
Settlers from the Cycladic Islands in the early Bronze Age (Miletos II, c. 3000-2000 BC) were followed by Minoans in the middle Bronze Age (Miletos III–IV, c. 2000-1450 BC) and Mycenaean Greeks in the late Bronze Age (Miletos V–VI, c. 1450-1180 BC). The Kingdom of Mira, a vassal state of the Hittites in western Asia Minor with its capital in Abasa (today’s Ephesos-Selçuk), gained Millawanda-Miletos in the late 13th century BC after the collapse of the Mycenaean palaces, and built a fortification wall to protect it. But during the raids of the so-called “Sea Peoples” the city fell under the domain of the Karians of Karkiša-Karia (Miletos VII, c. 1180-1050 BC), who were the allies of Troy in the Homeric Iliad (2.868-875). Miletos came under Greek control once again in the early Iron Age, after the so-called “Ionian Migration” (Miletos VIII, Iron Age, Protogeometric – Late Roman, c. 1050/30 BC–AD 400). The city boomed in the 7th and 6th centuries, colonising the Propontis (Marmara Sea) and the Pontos (Black Sea) regions. Sciences like philosophy, geography, and history also thrived in the city, advanced by the Milesians Thales, Anaximandros, Anaximenes, and Hekataios. Though conquered by the Persians in 494 BC, Miletos remained predominately Greek through Classical, Hellenistic, Roman, and Byzantine times. In the 11th century AD the city was first conquered by Turkish Selçuks, and – after another late Byzantine interregnum – by the emirate of Menteşe in the early 14th century AD. Miletos, then called Palatia-Balat, declined in the 16th/17th centuries AD due to the Maeander delta progradation. It ended up as a village relocated some three kilometres to the south, and named Yeni Balat (“New Balat”) after a catastrophic earthquake in 1955.22

Fig. 6. The Lion Harbour (“Harbour of Dokimos”?) viewed from the modern earth dam. The excursion group is standing around the weathered and broken statue of the western lion. In the middle ground, the bushy vegetation marks the spoil that earlier excavations had dumped into the silted up, but still swampy harbour basin. In the far background is the escarpment of the limestone plateau of the Stefania (the ancient Akron). Photograph: H. Brückner (1 October 2008).

22 Kleiner 1968, 1.
A brief history of Miletos and its dynamic palaeogeography in relation to its harbours is compiled in Table 1.

2. The palaeogeographic evolution of the Milesian Peninsula (H.B., A.H. & M.M.)

After the Late Glacial Maximum around 20,000 years ago, the sea level steadily rose during the late Pleistocene and early Holocene, due to global warming and subsequent worldwide deglaciation, from −120 m to its present position. The consequence was a dramatic shift in the shoreline. The mid-Holocene sea created several marine embayments at the western margin of the Anatolian Plate, especially in tectonic grabens. In the case of Miletos, the transgression of the sea inundated the Büyük Menderes Graben, with its peak probably reaching 50 or so kilometres inland, close to Aydın.23 In Greek and Roman times the bay at the Maeander mouth was part of the “(I-)Karian Sea” (see above, § 1.2).24 Geoarchaeological evidence has revealed that the area of Miletos was an archipelago during the time of the first maximum stand of sea level in the 3rd millennium BC.25 The biggest island encompassed the hills Kale Tepe (Turkish for “Castle Hill”)26 and Humei Tepe (Turkish for “Typhoid Hill”).27 The c. 300 m long and 100 m broad indentation between them, the future Lion Harbour, was in 2500 BC totally submerged by the sea, which even covered the area of the later sanctuary of Apollo Delphinios, the Delphinion (Fig. 10).

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23 Bay 1999b.
24 Strabon 14.1.9, 12: ἐξβολάς τοῦ Μαιάνδρου.
25 Brückner et al. 2006. The palaeogeographic reconstructions presented in this paper are based on more than 350 corings carried out in Miletos and its environs. Their interpretation is a combination of sedimentological, macro- and microfaunal and chronostatigraphical data on the one hand, and archaeological and historical evidence on the other. The final publication is in preparation: Herda et al. forthcoming. For the geoarchaeological research design, see Brückner 2003; 2007; 2011; Brückner & Gerlach 2011.
After 2500 BC, the siltation of the marine embayment started with the progradation of the Büyük Menderes delta and the formation of the river’s floodplain. The different phases and velocities of delta growth have been deciphered by Marc Müllenhoff, based on sedimentological and geoarchaeological criteria (Fig. 11). We know from this research that the delta front did not reach Miletos before late Roman times. However, in the Archaic period the city of Miletos already lay on a small peninsula which formed the northernmost tip of the larger Milesian Peninsula, the Milesia (Fig. 12). Since the Maeander delta cannot have been the sediment source, it must be asked how, why, and when the Milesian Archipelago was transformed into a peninsula.

Our corings have shown that the Minoans, arriving in c. 1900 BC (Tab. 1), chose an already settled island close to the mainland for the founding of a trade colony, in an easily defensible position with good harbours to the north, east, and south. The situation changed fundamentally when, in Mycenaean times, the island was connected to the mainland at its southern end via a sandbar. Such a tombolo is the result of coastal accumulation processes caused by the longshore current and adequate sediment supply. Coastal dynamics were therefore one agent for the supply of material for the consolidation of the islands. Several corings between the Minoan-Mycenaean settlement and the southern mainland provide evidence of the sandy sediments of the tombolo, with a thickness of several metres. Samples taken from the sandbar in corings Mil 38 and 266 14C-date the upper part of the tombolo to the 15th century BC at the latest.

The adjacent hills were another sediment source, as well as the slopes of the ancient Άκρον, “Heights” escarpment, named Stefania, “Crowning”, by the 19th-century Greeks (Fig. 6). Its steep, nearly 200 m high slope rises some four kilometres to the south of Miletos and is built up by marl-, sand- and claystones of the Neogene Balat Formation, which are weakly consolidated and easily erodible. Big square water pits, dug in the 1990s by farmers for irrigation purposes at the foot of the Stefania Plateau, revealed several layers of colluvium. The formation of these layers had already started with the first farming communities in the fourth millennium BC. Additionally, pollen records from the Lion Harbour and from nearby Lake Bafa indicate a progressive degradation of the so-called climax vegetation – a sparse deciduous oak forest – to a maquis-type vegetation, due to more extensive farming, herding, and the extraction of timber and firewood. This resulted in increased soil erosion with associated sediment accumulation in the coastal zone.

Finally, several cores within the city area show that material had intentionally been dumped by the Milesians for consolidation purposes in order to gain more space for settling. This was especially the case from the 6th century BC on, when the city was restructured according to a regular insula street grid system.

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26 The Turkish “Kale” refers to the Byzantine-Turkish “castle” on top of the hill, most probably standing on the remains of the phleurion, built by the Persian satrap Tissaphernes in 41 BC (Thukydides 8.84.4; 8.85.2; 8.109.1; see below, § 3.1). The high standing ruins of the theatre and the baths led to the late Byzantine (13th/14th century AD) placename of Miletos, τὸ Παλάτιον (“the palace”), respectively τὸ κύρτσιον, ἡ σκάλα τῶν Παλατίων, though the old place name was still preserved in the designation “Milesian Lake”, attested for the 13th century AD, see below § 3.4 with n. 157. When the Turkish emirate of Menteşe conquered Palatia from the Byzantine Greeks in the early 14th century AD, they named the place “Balat”, after “Pa-

27 For Humai Tepe = “Typhoid Hill”, see Wulzinger et al. 1935, 39 and Greaves 2002, 148 (Turkish humma designating “any kind of high-fever, including that associated with malaria and typhoid”). This designation hints at the health problems caused by the extremely humid climate in the flooded Maeander plain, where diseases like malaria were common (Wiegand & Schrader 1904, 11-2; Wiegand 1929, 14-5; Philippson 1936, 9; Thonemann 2011, 18, 299). This fact prompted Th. Wiegand to place the excavation house some 5 km away from the dig, on a 134 m high hill close to the village of Akköy (Wiegand 1970, 41: letter dated 28 September 1899).

28 Müllenhoff 2005, see the summary on pages 187-215 with figs. 48-56.

29 Herda et al. forthcoming.

30 Herda 2006, 10 lines 28-9 (so-called Molpoi Inscription, Hellenistic copy of a late Archaic sacred law, mentioning the course of the Milesian New Year’s procession to Didyma via the Akrón), 261-5 figs. 9, 17.

31 Wiegand 1929, 3 fig. 4, 10 fig. 9, Beilage; Kleiner 1968, 1 figs. 2-3.

32 Schröder 1990, 64-7 figs. 3-4; Schröder et al. 1995, 138-40 figs. 39-40; Tuttahs 2007, 28-33.

33 Bay 1999a.


35 Brückner et al. 2006, 76-80.

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<th>Historic changes</th>
<th>Palaeogeographic changes</th>
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<td>Late Chalcolithic (Miletos I)</td>
<td>The autochthonous population and its material culture show significant influences from the culture of the Cycladic Islands</td>
<td>Postglacial sea level rise had formed the Milesian Archipelago; climax vegetation dominated by deciduous oak forests</td>
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<tr>
<td>Early Bronze Age (Miletos II)</td>
<td>First settlers may have arrived from the Cycladic Islands; people in Miletos at that time already spoke an Indo-European idiom (“Proto-Anatolian”)</td>
<td>Highest position of local sea level; reduction of settlement space due to transgression</td>
</tr>
<tr>
<td>Minoan – Mycenaean Millawanda-Miletos</td>
<td>Colonisation by Minoan settlers from Crete in the Middle Bronze Age (Miletos III–IV, c. 1900-1450 BC); conquered by Mycenaen Greeks in the late Late Bronze Age (Miletos V–VI, c. 1450-1220 BC); c. 1220-1180 BC Hittite control over Miletos VI, construction of fortification wall</td>
<td>Intense degradation of vegetation due to increasing anthropogenic impact (introduction of the goat, among other animals); gradual decline of natural fauna; resulting soil erosion together with slight marine regression and longshore drift initiated the transition from the archipelago to the Milesian Peninsula; Athena Temple Island connected to mainland via tombolo before c. 1500 BC</td>
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<tr>
<td>Middle to Late Bronze Age – Early Iron Age (Miletos VII)</td>
<td>Destruction of Miletos VI fortification c. 1180 BC; indigenous Karians from the hinterland gain control over Miletos; allies of Troy against the Achaioi/Mycenaen Greeks (cf. Homer, Iliad 2.868-875)</td>
<td>Kale Tepe – Humei Tepe Island also connected to the adjacent southern flank of the Maeander Graben via tombolo; Theatre Harbour is now an embayment (c. 8th–7th centuries BC)</td>
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<tr>
<td>Early Iron Age (c. 1050-700 BC)</td>
<td>Greek-Ionian Migration due to excellent natural harbours and position protected from the hinterland</td>
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<tr>
<td>Archaic (Miletos VIII)</td>
<td>Construction of fortifications, including the closable Lion and Theatre(?) Harbours; political, economic and cultural prosperity; foundation of more than 80 colonies (Black Sea region etc.); Thales, Anaximandros, Anaximenes, Hekataios establish Ionian Natural Philosophy and historiography. First half of 6th century BC: re-planning in a new grid system (so-called Hippodamian grid); second half of 6th century BC: enlargement of the city centre around the agora and the Delphinion by man-made infill</td>
<td>Continued degradation of the ecosystem; palynological analyses prove increase in maquis elements and indicators of human impact; siltation especially north of Kalabaktepe and in the Theatre Harbour due to strong erosion and denudation processes</td>
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<tr>
<td>7th-6th Centuries BC</td>
<td></td>
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<tr>
<td>494 BC</td>
<td>Naval battle of Lade, victory of Persians and the destruction of the city</td>
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Table 1. Historic and palaeogeographic changes in Miletos. Modified after: Brückner et al. 2006, 68 tab. 2.
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<tr>
<td>After 479 BC - 133 BC</td>
<td><em>Classical – Hellenistic (Miletos VIII)</em> Building of the new city by enlargement of the late Archaic grid system; industrial processing of wood and wool, metallurgic industry; lion statues installed in the Lion Harbour and construction of the Harbour Hall end of 4th century BC; now called “Harbour of Dokimos”?</td>
<td>Continued degradation of the ecosystem; palynological analyses prove increase in maquis elements and indicators of human impact; siltation especially north of Kalabaktepe and in the Theatre Harbour due to strong erosion and denudation processes</td>
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<td>133 BC – 4th Century AD</td>
<td><em>Roman (Miletos VIII)</em> Erection of larger Harbour Monument c. 100 BC, Miletos in conflict with Priene over access to Maeander mouth in 905 BC; C. Iulius Epikrates takes possession of new alluvial lands in Maeander delta with the permission of Augustus; new economic growth, renovation of the theatre in 1st/2nd centuries AD, dredging of the Theatre Harbour, new city wall end of 3rd century AD; dredging of harbours in AD 343 by Skylakios (?), canal in Maeander plain between Miletos and Lade, channelling of the Maeander</td>
<td>Vegetation dominated by maquis and phrygana, endangering of Milesian Peninsula by prograding Maeander Delta, accelerated siltation of the Lion and Theatre harbours</td>
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<td>5th Century AD – AD 1327</td>
<td><em>Byzantine Miletos</em> Episcopal See since AD 537/8; proconsul Vitianus built a dam “against the winter floods” in 2nd half of 5th century AD, reduction of fortified settlement in AD 538 with exclusion of Lion Harbour; erection of castle on Kale Tepe (in 7th/8th cent.?); gradual decline; after Battle of Manzikert AD 1071, first invasions by Turkish Selçuks, temporal devastation(?), 13th to early 14th century AD; late Byzantine “renaissance”; Miletos now called “Palatia”</td>
<td>Increased siltation by Maeander alluvium; gradual integration of Milesian Peninsula into the floodplain; from AD 1000 separation of Latmikos kolpos from open sea, called “Milesian Lake” (Milesie limne) in 13th century AD.</td>
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<tr>
<td>AD 1327 – 1955</td>
<td><em>Miletos as Palatia-Balat part of Emirate of Menteşe, since AD 1425 of Ottoman Empire</em> Continued decline of the city until the 16th/17th centuries AD; since then only village left; settlement relocated as ‘Yeni Balat’ (New Balat) some three kilometres to the south after a severe earthquake in 1955</td>
<td>Loss of access to open sea c. AD 1500; subsequent siltation of all harbours; finally Maeander river port and open sea harbour 6 km SW of Palatia-Balat (?)</td>
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Table 1. *Historic and palaeogeographic changes in Miletos. Modified after: Brückner et al. 2006, 68 tab. 2.*
A summary of these findings leads to the conclusion that the transformation from archipelago to peninsula started around 1900 BC. Several corings around the Temple of Athena reveal the siltation process and the gradual changeover from shallow marine to coastal and finally terrestrial conditions.\textsuperscript{37} A slight marine regression, together with the natural and human-induced areal denudation and accumulation processes described above, contributed to the consolidation, which in the western part of the peninsula (south of the island in the area of the later Temple of Athena) most likely occurred in the late Bronze Age (15\textsuperscript{th} century BC) at the latest (see above).

It is astonishing what Milesian myths tell us about the Minoan-Mycenaean times. One story is about the eponymous founder hero Miletos, who had come from Minoan Crete, fleeing King Minos.\textsuperscript{38} It is preserved in

\textsuperscript{37} Brückner et al. 2006, 70-3 fig. 3; Tuttahs 2007, 343-5.

\textsuperscript{38} Herda forthcoming, § 2.2.1.
Fig. 10. Miletos in Hellenistic-Roman times and the position of the shoreline during the maximum marine transgression, Archaic, and Roman Imperial times. Around 2500 BC, the Milesian Archipelago consisted of several islands. It is interesting to note that by 2500 BC the totally submerged indentation that later hosted the Lion Harbour even encompassed the area of the later Delphinion. Source: modified after Müllenhoff et al. 2009b, 20 f. fig. 1.
a late Antique scholium on the Hadrianic geographer Dionysios Periegetes. Miletos had first settled on the mainland in a place called Oikous, “The Houses”. Oikous was a suburb of Miletos, where a famous sanctuary of Aphrodite was located on a small hill at the ancient sea shore, modern Zeytin Tepe ("Olive Hill"), some 2 km southeast of the city (Fig. 26.11). After Miletos’ death the following happened:

Κελάδων δὲ ἄρξας Οἰκοῦντος τὸν πατέρα ἐς τὴν πλησίον νῆσον ἔταπσεν, οὗ καὶ αὐτὸς μετῳκίσθη κατὰ χρησμὸν, καὶ Μίλητον αὐτὴν ὠνόμασεν. Γέφυρα δὲ διορίζει τὰ νῦν Οἰκοῦντα καὶ Μίλητον.

But Keladon, who ruled over Oikous, buried his father on an island nearby where he himself went to dwell because of an oracle. He called the island 'Miletos'. A dam connects today’s Oikous with Miletos.

The Greek term used to designate the connection between island and mainland is γέφυρα. In the Homeric epics gephyra is a natural or artificial "dam". In later sources it can also mean “bridge”, distinct from the term γαιεών (Latin pulvinus), designating a separate “sandbank” or “river island” without a connection to firm ground, being the result of natural alluviation. That the term is used here in the Homeric sense becomes clear from the afore-

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39 Scholium on Dionysios Periegetes 825.
40 It was identified only in 1990 through the find of an Archaic dedicatory inscription to "Aphrodite in Oikous": Herrmann 1995, 282 fig. 82 [Ἀ]φροδίτηι | τὴν Οἰκοῦντ[Ą]; N. Ehrhardt in: Herrmann et al. 2006, 174-176 pl. 28 no. 1279; cf. Theokritos Thalysia 7.115-6; Alakata 28.3-5; Poseidippos Anthologia Palatina 12.121.1; Scholium on Dionysios Periegetes 825. For the excavation, see Senff 2003.
41 For instance in Iliad 5.88-9.
42 Gephyra as "bridge" e.g. Herodotos 4.85, 97. The term γαιεών is attested for Augustan Miletos: P. Herrmann in Herrmann et al. 2006, 82-5 no. 1131.7 γαιεώνας. For γαιεών/pulvinus as "sandbank" or "river island" see Herrmann 1994, 212-3; Herrmann 1996, 6 with n. 10; see below, § 3.4 with n. 154.
mentioned geoarchaeological evidence of the *tombolo*. We can also draw on how Pindar in his sixth Nemean ode labelled the Isthmus of Corinth:

\[ \text{πόντου γέφυρα, "gephyra of the sea".} \]

The question remains of whether and how the ancient Milesians could still know about the landscape transformation of their city in the middle and late Bronze Age. Did they produce a retrospective construction, aided by

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43 *Nemean* 6.40.

44 The term *gephyra* is used in the sense of an artificial dam in a Milesian inscription of the second half of the 5th century AD: W. Günther in Herrmann et al. 2006, 81-2 no. 1129.3-4 γέφυραν ποιήσατο ὀδίταις | ἄλκαρ χειμερίων πληθομένων ὕδατον. The "gephyra for wayfarers", initiated by the proconsul of Karia, Vitianus, is designated as "a bulkwork against the winter floods". Tuttahs 2007, 418 f. with fig. 449 locates the dam within the city, east of the South Market, roughly at the same place as the modern dam (see fig. 27.5). But he does not take into account the process of alluviation between AD 300 and 1000: Müllenhoff 2005, 201 fig. 53, 203 fig. 53. Whether this dam crossed the former neck of the gulf of Latmos-Herakleia, as Thonemann 2011, 317 assumed, remains similarly unlikely. The dam leading to Sarıkemer some 8.5 km to the northeast (named Kız Düşmesi, "Girls Paving") is most probably only late Medieval: see below n. 191.
observing contemporaneous natural phenomena, as Pausanias did (see below, § 3.4)? Or can we identify a true story within mythical tradition? We leave this issue open for further discussion.

In the eastern part of the peninsula, one of the largest former island including Kale Tepe and Humei Tepe, marine and littoral conditions lasted until the beginning of the Archaic period, as evidenced by our corings between the later South Market and the Lion Gate in 2009 and 2011, which detected a second tombolo. It expanded during the Protogeometric and Geometric periods (10th–8th centuries BC), connecting the island to the southern mainland. In consequence, the Theatre Harbour, the second important harbour of Miletos, was transformed into an embayment. On the tombolo’s eastern shore, a new landing point for ships developed, the “East Harbour” (see § 4.2.). In late Archaic and Classical times, the terrain around the agora was further consolidated with infill in the course of the progressing urban development of the city centre.

It was only during Roman Imperial times that the peninsula was finally endangered by siltation from the advancing Maeander Delta (Figs. 10-11). In Byzantine times, the city was still able to communicate with the open sea via brackish waters, until the delta cut off the marine access and finally integrated the peninsula into the floodplain after AD 1500.

The present city has four harbours, one of which is large enough to host a fleet.

The reference to a “fleet” (στόλος) indicates a war harbour, which had to be closable. Strabon is most likely referring to the Lion Harbour, since its narrow entrance fulfilled this prerequisite. A “closed harbour” (κλειστός λιμήν) is mentioned in the inscription on an altar, found in front of the so-called Lion Gate at the southeastern edge of the city wall. It was dedicated to Apollo Didymeus and Artemis Pytheie, the main gods of Didyma, by a certain Biares, son of Biaros, c. 85 BC. He held the office of epistates of “the temple of Apollo of Didyma and the walls and towers and the security of the closed harbour [of Miletos, A.H.]”. Obviously the epistates Biares was a kind of “supreme commander” of the Milesian defences, which stood under the divine protection of Apollo and Artemis. The state office of the epistates might have been introduced under Athenian influence in the 5th century BC; but more probably it is an Archaic Ionian legacy, as already the father (?) of Polykrates of Samos, Aekes, was in charge of epistasis, collecting the σύλη, “seizure”, from ships of foreign merchants arriving in Samos. At least from the early 3rd century BC onwards, several epistatai formed a board which presided over the state council (boule) of Miletos. This stresses the importance of the supreme commander within the political hierarchy of the city, as well as the significance of the Lion Harbour as a war harbour.

It is reasonable to suggest that Miletos already possessed a closable harbour for its fleet in the mid-7th century BC, when it started to colonise the Propontis and Pontos as well as Naukratis in Egypt. During the same
period, a land wall cutting off the peninsula between Kalabak Tepe (“Burdock Hill”) and the later Lion Gate was built.\textsuperscript{54} We may assume that the closable harbour was integrated into the defences which also protected the sea side of the peninsula.\textsuperscript{55}

In Archaic times, there were two closable harbours: the Theatre Harbour (see below, § 4.1; Figs. 10, 26), and the Lion Harbour. We will concentrate here on the Lion Harbour, which fits the criteria best: (i) its opening to the sea is much closer than that of the Theatre Harbour, which made it easier to defend; (ii) its entrance is better protected against the western winds (‘Turkish Imbat, from Italian \textit{imbatto}, “sea breeze”)\textsuperscript{56} by the protruding tip of Kale Tepe; and (iii) it was, therefore, also better protected against siltation, which is clear from its long period of use.

It is unlikely that a fortification wall ran along the inner margins of the harbour. First for strategical reasons, because it would have offered the enemy lots of space to attack; second, it would have diminished the practical use of the harbour. Nevertheless, its existence was assumed by A. von Gerkan for the Classical period;\textsuperscript{57} but the 2.25 m thick wall he identified as the city wall could only be detected along the southern and southwestern fringe of the Lion Harbour (Fig. 13). Therefore, it makes much more sense to interpret it as quay wall for the mooring of bigger vessels.\textsuperscript{58} The first phase of this quay may belong to the late Archaic period, when the agora area was extended to the north and the Delphinion was built in marble,\textsuperscript{59} serving as it did as the starting point for the Milesian colonial enterprises. The quay wall existed in the late Classical or early Hellenistic period at the latest, when the overall monumentalisation of the harbour was completed with the erection of the Harbour Hall. The L-shaped sta in the Doric order consisted of a 125 m long southern and a 35 m long western wing, perfectly fitted into the orthogonal \textit{insulae} street grid. The southern wing had a single row of 30 chambers to the south, although initially chambers were missing in the western wing. Its intercolumnia were closed by barriers, and at its northern end a room was built, opening to the north with two columns in antis, perhaps functioning as a small temple.\textsuperscript{60} When all the streets of the city were paved under the rule of the Roman emperors Trajan and Hadrian, from AD 100/101 onwards, the southern quay was endowed with an 11 m broad pavement of marble slabs.\textsuperscript{61}

The quay clearly points to the double function of the

\textsuperscript{53} This is also assumed by Olaf Höckmann (Mainz) in a letter dated 29 January 2012. He has kindly provided us with his unpublished manuscript: Höckmann forthcoming.

\textsuperscript{54} Cobet 1997; Blum 1999.

\textsuperscript{55} Cobet 1997, 257, 263 and Blum 1999, 53 argue that between the mid-7th century and the late 6th century BC there was no wall facing the sea, but only a land wall cutting off the peninsula between Kalabak Tepe and the later Lion Gate; Lang 1996, 216-7 even neglects the existence of an Archaic land wall connecting Kalabak Tepe with the city districts to the north, cutting off the whole peninsula; but see e.g. von Graeve 1997/98, 80-3 figs. 12-4 (section between Kalabak Tepe and later ‘Sacred Gate’, detected by geophysics and partly excavated). The lack of a sea wall does not seem convincing for strategical reasons: an open shoreline would have offered too many potential landing places for attackers (von Graeve 2000, 117, 122 n. 21; Frederiksen 2011, 170). Sea walls are not uncommon in 7th century cities in Ionia (Smyrna: Frederiksen 2011, 188-90 fig. 100; for Samos a sea wall and a closed harbour are attested in the literary sources in the time of Polykrates: Herodotos 3.39, 60; cf. Kienast 1978, 36-8, 99-102; Frederiksen 2011, 184-5; see below, n. 84), mainland Greece (Halai, East Lokris: Frederiksen 2011, 145 fig. 43; Abdera, Thrace: Frederiksen 2011, 122-24 fig. 11), in the Aegean islands of Lemnos (Hephaistia: Frederiksen 2011, 147-8 fig. 48) and of Naxos (Frederiksen 2011, 173-4 fig. 81), as well as in Sicily (Megara Hypelaea: Frederiksen 2011, 162-3 fig. 67).

\textsuperscript{56} Turkish \textit{imbat}/\textit{embad} originally stems from the Italian \textit{imbatto}, ‘the earliest record seems to be the Catalan variant “\textit{imbat}” (1313)’: Kahane & Tietze 1958, 255-6 no. 341 imbatto. For the difficult \textit{Imbat} winds at the southern coast of the Milesian peninsula east of Cape Posideon/Monoden-dri/\textit{Tek Ağac}, see already the portolan of the Ottoman admiral Piri Re’s of 1521 (Kitab-ı Bahriye), who called them “\textit{Imbad}, similar to the modern Greek word for this kind of wind, \textit{εμβάτης} (Wiegand 1929, 16; Tuttahs 2007, 431 with n. 1203a). In the winter, when the ancient sailing season was interrupted, northern winds may have predominated in the bay of the Maeander mouth around Miletos. But the ancient situation is difficult to reconstruct, as modern measurements relate to a completely different geographic and climatic situation: Tuttahs 2007, 26-28 esp. 20-3 (data of two modern weather stations at the SW and SE foot of Mykale Mountain, c. 5-10 m a.s.l.). P. Wilksi in Wiegand 1929, 46, 48 (German excavation house in Akkoy, 137 m a.s.l.).

\textsuperscript{57} von Gerkan 1922, 55; 82-6, 90 pl. 12; von Gerkan 1935, 110-14 fig. 81; cf. von Graeve 1996, 320-1; Blum 1999, 72-3; von Graeve 2000, 126; Greaves 2000a, 55. Lehmann-Hartleben 1923, 128, argues against this assumption: “im eigentlichen Inneren können die Mauern nicht umgelaufen sein”.

\textsuperscript{58} Tuttahs 2007, 331-2 fig. 382.

\textsuperscript{59} Herda 2005.

\textsuperscript{60} von Gerkan 1922, 89-91; Lehmann-Hartleben 1923, 147-8; Kleiner 1968, 51-3 fig. 29; Kleiner 1980, 62-3; Müllenhoff et al. 2009a, 99-101 figs. 3-4.

\textsuperscript{61} von Gerkan 1922, 96, 98 pl. 28; Kleiner 1968, 55 fig. 31; Tuttahs 2007, 354 fig. 384.
Lion Harbour as a war and a commercial harbour, not to mention its symbolic function (Fig. 14) - the role of the Delphinion as the main state sanctuary in the southeastern corner of the harbour has already been mentioned. In the southwestern corner of the quay, close to the quay wall, two monuments were erected at a later point in time: the larger one, c. 18 m tall, was decorated with prows of battle ships in relief and celebrated a naval victory, most probably of the Milesian fleet; the sculptural decoration depicted a monumental tripod standing on lions, clearly alluding to Apollo, the main deity of the polis Miletos. It was possibly occasioned by the Roman victory of Lemnos (73 BC), or that of Gnaeus Pompeius Magnus over the Cilician pirates in 63 BC. The Milesian fleet had been involved in both events. But a slightly earlier Milesian naval victory around 100 BC also seems a possible candidate: at that time, the Milesian admiral (nauarchos) Hegemon, son of a Philodemos, was honoured with a

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statue in the Delphinion “because of his virtue and good-will”. Perhaps he had successfully battled against the pirates who destabilised the whole Mediterranean at the beginning of Roman rule, until Pompeius finally defeated them.64 Another possible background is offered by the conflict with Priene, Magnesia, and other cities of the

63 von Gerkan 1922, 55-73 figs. 66-87 pls. 2, 8, 9.4, 19-22; Kleiner 1968, 54-9 figs. 31-4; Kleiner 1970, 121-2 fig. 1; Kleine 1980, 59-60 fig. 24; Greaves 2000a, 56; 2002, 142; Schollmeyer 2011. In the often reproduced reconstruction of von Gerkan 1922, 70 fig. 86 pl. 22, a dedicatory inscription to deified Augustus is added on the base of the tripod (Ἀὐτοκράτορι Καίσαρι | θεῶι θεοῦ υἱῶι Σεβαστῶι | οἱ δήμοι ὁ Μιλησίων). This is pure fantasy, dependent on von Gerkan’s dating of the monument to early Imperial times: von Gerkan 1922, 72; Kleine 1980, 59. Kleiner 1968, 56, who preferred an earlier, Hellenistic dating, questioned whether the original inscription, of which nothing is preserved, would have been left untouched under the Roman emperors. For the “Apolloine iconography” of the large so-called Harbour Monument and its possible connection with a Milesian naval victory, see Tuchelt 1979, 113-4; Schollmeyer 2011, 15-6; Bol 2011, 4.

64 Hegemon inscription: A. Rehm in Kawerau & Rehm 1914, 390-1 no. 167, 3-5 ναυαρχήσαντα | ἀρετῆς ἑνὲκεν καὶ | [ἐ]ὐνοίας τῆς ἑαυτόν; see A. Rehm in Kawerau & Rehm 2014, 390 n. 1 on the prosopography and dating of the office of nauarchos; Hiller von Gaertringen 1932, 1612; and Ehrhardt 1988, 194 with n. 117. It is also attested in the Milesian colonies Abydos, Kyzikos, Istrus, and Pantikapaion. On the corsairs and Miletos, cf. Cicero Verres 2.2.89: Miletos built 10 war ships to help Rome in the war against Mithridates of Pontos and the corsairs in 84/3 BC. In 75 BC, young Caesar was captured and held to ransom by Cilician pirates on the former Milesian island of Pharmakoussa, where he was freed by the Milesian Epikrates, cf. Polyainos 8.23.3; Plutarchos Caesar 1-4. Before 67 BC, the sanctuary of Didyma was plundered by corsairs: Plutarchos Pompeius 24; cf. Hiller von Gaertringen 1932, 163, Strabon 144.17 p. 653c remarks that the Milesian archipelago of Tragia (Agathonissi) had functioned as a shelter for pirates; cf. Triantafyllidis 2010, 10.
lower Maeander plain in the 90s BC over the “right of sailing in", either into the Maeander mouth to reach the river harbours further inland, or through the entrance to the Gulf of Latmos. Both accesses had come under Milesian control when the Maenadian delta, due to ongoing siltation, cut Priene off from the open sea and progressed to the south in the direction of Miletos, finally reaching its territories (Fig. 11). The conflict was only settled in the late 90s with the help of Rome and some Greek states, in favour of Priene and the other concerned cities.65

A recently discovered roof tile stamp from a Milesian phrourion on the island of Tragia, today’s Agathonis, some 20 km west of Miletos, is dated to “the third (year) of the city-god, (the year) of the victory of the safe harbour” (ἐπὶ τοῦ τρίτου | θεοῦ πόλεως | ἐνιμένου νικῆς) (Figs. 15.a-b).66 The city-god mentioned is Apollo Delphinios, whose sanctuary is located at the Lion Harbour. Is the “victory of the safe harbour” to be related to the Lion Harbour,67 the base of the Milesian fleet, and did the conflict take place close by, as so many other naval battles had, starting with the famous battle of Lade in 494 BC?68 The dating to “the third year of the (eponymic) city-god” had, starting with the famous battle of Lade in 494 BC68 another famous battle was fought at Lade between the Rhodians and Philip V in 200 BC: Polybios 16.15.6; cf. Kleiner 1968, 18-9; see also Greaves 2000a, 42-3, 49 fig. 4.

The dating to “the third year of the (eponymic) city-god” places the victory before 89/88 BC.69 The lettering as well as the find context of the roof tile favour a date c. 100 BC.70 This date would fit well with the honorific statue of the admiral Hegemon, the construction date of the Great Harbour monument, as well as the conflict with Priene. A few years later, Miletos’ efforts in developing her naval capabilities are also apparent in the office of the supreme commander (epistates) Biaren, being, inter alia, responsible for the security of the “closed harbour”, evidently the Lion Harbour (see above).

The smaller naval victory(?) monument in the southwestern corner of the quay repeated the three-sided form of the taller one, and was erected for a certain C. Grattius C. F. Gal(eria) in the late 1st century AD.71 The Harbour Gate was dated slightly earlier, from the first half of the first century AD. It was situated at the opposite side of the quay, between the eastern end of the Harbour Hall and the Delphinion, marking the limit between the harbour and the city centre.72

The shipsheds (neoria, neoiskoi) for warships – in the Archaic and Classical periods usually triremes of c. 5 m breadth and c. 38 m length – may have been erected at the eastern margin and, less possibly, also at a part of the western margin of the harbour, as suggested by Olaf Höckmann73 and Gerhard Tuttahs.74 Since the ships were pulled directly into the sheds on slipways, as was also the

65 Cited from von Gerkan 1922, 73-80 figs. 88-95, pl. 1; Kleiner 1968, 56, 59-60 figs. 35-6. The inscription is palaeographically dated to the Flavian period (AD 69-96) by Kleiner 1968, 56. A. Rehm in Hermann 1997, 12 no. 190 dated it to the 1st century AD. Hermann 1997, 198 no. 190 pl. 13, 1 (Hermann cites Geza Alföldy [personal communication] who identifies Grattius with a Roman senator from Spanish Saguntum and adds that the inscription will have been completed by Grattius’ cognomen and his official title).
66 Triantafyllidis 2010, 35-5 figs. 44-5.
67 Cited from von Gerkan 1922, 73-80 figs. 88-95, pl. 1; Kleiner 1968, 56, 59-60 figs. 35-6. The inscription is palaeographically dated to the Flavian period (AD 69-96) by Kleiner 1968, 56. A. Rehm in Hermann 1997, 12 no. 190 dated it to the 1st century AD. Hermann 1997, 198 no. 190 pl. 13, 1 (Hermann cites Geza Alföldy [personal communication] who identifies Grattius with a Roman senator from Spanish Saguntum and adds that the inscription will have been completed by Grattius’ cognomen and his official title).
68 Triantafyllidis 2010, 35-5 fig. 31; Kleine 1980, 74-5 fig. 30.
69 See Höckmann forthcoming.
70 Triantafyllidis 2007, 351-2 fig. 382. Much to our regret this admirable engineer and scholar died on 1st of January 2013, while this article was in preparation. For shipsheds in the Lion Harbour see also: Greaves 2000a, 42-3, 49 fig. 4.
case, for example, at the harbour of Samos in the time of Polykrates (before 528 BC),75 or in the 5th century BC harbours of Sicilian Naxos and the Zea Harbour of Athens, a quay wall is missing in front of the shipsheds.76 According to Herodotos (6.8.1), Miletos was able to supply 80 triremes in the battle of Lade in 494 BC, even without following the proposal of Hekataios to make use of the treasures of the oracular sanctuary in Didyma to enlarge the fleet.77 But its fleet may originally have reached the size of the largest Greek contingent at Lade, the Chian fleet, which consisted of 100 ships: shortly before the battle of Lade, the Milesian tyrant Aristagoras, organiser of the revolt, led a small Milesian fleet of unknown size to carry settlers to his stronghold Myrkinos in Thrace.78 There was not enough

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75 Cf. Herodotos 3.45; Lehmann-Hartleben 1923, 56-8. For the location of the Samian shipsheds, see Kienast 1978, 38. He thought that the western starting point of the southern mole was in front of the inner harbour wall, where the quay extends to an area of 50 to 80 m, projecting into the sea to the east, see Kienast 1978. "Gesamtplan"; cf. the historical maps of T. Spratt (pl. 3, 1-2; 4, 1) as well as the aerial photograph (pl. 6, 2). But this area alone is too small for the Samian fleet, which consisted of 100 pentekonters and 40 triremes in the time of Polykrates (Herodotos 3.39, 44); this would require c. 910 m of shipsheds (6.5 m for each ship). One should therefore expect that the neoria ran along the whole western semicircle of the harbour, and extended to the southern mole, which is now mostly submerged in a depth of 2.75-3.20 m, projecting to an area of 50 to 80 m, projecting into the sea to the east; see Kienast 1978. "Gesamtplan"; cf. the historical maps of T. Spratt (pl. 3, 1-2; 4, 1) as well as the aerial photograph (pl. 6, 2). But this area alone is too small for the Samian fleet, which consisted of 100 pentekonters and 40 triremes in the time of Polykrates (Herodotos 3.39, 44); this would require c. 910 m of shipsheds (6.5 m for each ship). One should therefore expect that the neoria ran along the whole western semicircle of the harbour, and extended to the southern mole, which is now mostly submerged in a depth of 2.75-3.20 m, projecting into the sea to the east; see Kienast 1978. "Gesamtplan"; cf. the historical maps of T. Spratt (pl. 3, 1-2; 4, 1) as well as the aerial photograph (pl. 6, 2).

76 On shipsheds see e.g. Blackman et al. 1996; Blackman 2004; Baika 2006; Tuttahs 2007, 348 f. fig. 380, 352 f. fig. 383; Blackman 2010. The 4th century BC shipsheds of Oiniadai (Kolonas 1989-90; Vött & Brückner 2006) and the recently excavated 5th century BC shipsheds in Naxos on Sicily also have slipways: Lentini et al. 2008; Lentini & Blackman 2009, 41-79 figs. 3, 5, 18-19, 22, 25-37; pp. 80-86 figs. 1-6. On the 5th-4th century BC shipsheds of the Zea Harbour of Athens see now Lovén & Schaldemose 2012; B. Lovén & M.M. Nielsen in this volume 235-241. In the mid-4th century they were extended in length (c. 80 m) to house two ships in a row; see V. Gabrielsen in this volume 37-48. The two recently detected Hellenistic shipsheds of the Milesian phrourion in Kastraki on the island of Tragia-Agathonisi most probably had slipways, as they are partly cut into the rocky coast line: Triantafyllidis 2010, 17 fig. 12, pp. 18-9 fig. 13 no. 7 (not mentioned explicitly in the text).

77 Cf. Herodotos 5.36; Hiller von Gaertringen 1912, 1597.

78 Herodotos 5.124, 126. Perhaps the fleet of 100 units with which Histiaioi’s nephew Aristagoras, at that time tyrant in Miletos, wanted to attack Naxos in the name of the Persian king c. 500 BC (Herodotos 5.31), corresponds to the total number of Milesian warships. On different Milesian ship types see Greaves 2000a, 40 (pentekonters, trireme, myparo, keles, lembos); on Milesian ship building resources: Greaves 2000a, 49-50, 52; Greaves 2002, 14. On the complex problems with calculating the number of citizens and the total population of Miletos from the number of warships, see Tuttahs 1998, 41-53 tab. 41; Greaves 2000a, 52-3 with fig. 9; Greaves 2001, 100; Greaves 2007, 14-7; Tuttahs 2007, 39-40. A Milesian sailing boat without oars, perhaps a merchant vessel, is depicted on one of the upper limestone column shafts of the Archaic temple in Didyma: Schneider 1996, 80 fig. 4 with comment in n. 9.
space in the Lion Harbour for this number of shipsheds. For 80 shipsheds, O. Höckmann has calculated that at least 528 m shoreline would be required, whereas the eastern fringe of the Lion Harbour offers max. 250 m, enough for 38 shipsheds.79 We may, therefore, assume that there were additional buildings in the other harbours of the city; first of all in the Theatre Harbour, which was most probably another closable harbour and of similar size as the Lion Harbour (see below, § 4.1).80

The Lion Harbour was probably the harbour that Alexander blocked with a few triremes, “at the narrowest part of the harbour entrance”, during his siege of the city in 334 BC.81 This entrance was protected by two artillery towers or bastions at the adjacent tips of Kale Tepe and Humei Tepe, at a distance of c. 200 m from each other;82 it was artificially narrowed to c. 20-40 m by two moles, remnants of which might still be hidden under the fluvial sediments of the Maeander. They may be identified in the geomagnetic anomaly “F” running slightly diagonal to the southern flank of the modern dam (Fig. 16; see below, § 3.3.3).

It is to be expected that the integration of the moles into the defences and the closing of the Lion Harbour occurred in the Archaic age. Moles built of stone were an important feature of the Archaic closable harbour of Samos.83 The Samians were famous for their building efforts, and the construction of the Samian moles was much more intricate than that of the assumed moles in Miletos.84 Other closable

79 Höckmann forthcoming (the average measurements for trireme shipsheds are c. 6.5 m width and c. 40 m length). The reconstruction of shipsheds on the western fringe of the Lion Harbour by Tuttahs 2007, 351 fig. 382 is less likely due to the sloped terrain.
80 The reconstruction of shipsheds at the western mouth of the Theatre Harbour by Tuttahs 2007, 351-2 fig. 382 seems less probable as it assumes that the shipsheds were open to the sea and therefore easy to attack. When producing this reconstruction, Tuttahs had no knowledge of how deep the harbour cut into the peninsula in Archaic times.
82 Cf. Blum 1999, 57 fig. 4, 62-3 with fig. 15 (remains of a tower(? ) at the NE corner of Kale Tepe, built of large limestone and mica schist slabs, partly Archaic in workmanship; pottery finds dated to the 6th and 5th centuries BC; the structure is considered to be an Archaic tower by Kleine 1980, 20 fig. 5); 64-6 with figs. 14, 16-7 (remains of a tower(? ) at the NW corner of Humei Tepe, built of large mica schist slabs);72-3 with fig. 24 (both structures are labelled with “Turm?” in the map); thereafter Tuttahs 2007, 353. According to Blum 1999, 72 the distance of 200 m between the structures argues against the possibility that both artillery positions could protect another, as well as the harbour entrance. This is true until the first half of the 4th century BC; but at least from the mid-4th century BC the range of stone and arrow throwing catapults, especially those which were torsion-based, reached 100-300 m and more: Marsden 1969-1971, I 86-98, 142-48 with figs. 6-10; Rihll 2007, 228-31. On early artillery towers, cf. Marsden 1969-1971, I 126-39; Ober 1987; 1992; Milner 1997, 211-2; Rihll 2006; 2007, 31-4. Therefore, the entrance width of the harbours of Alexandreia (200 m) and Attaleia (225 m) did not constitute a security problem, especially as they were protected by artillery positions on both sides; this was a frequent feature of Hellenistic harbours; see already Lehmann-Hartleben 1923, 74.
83 Herodotos 3.60.
84 Kienast 2004, 74-6 fig. 71; see above n. 75. The city wall as well as the tunnel of Eupalinos have been archaeologically dated to the middle of the 6th century BC at the latest, so that Kienast (2004, 74 n. 19) also considers the harbour moles to be pre-Polykratean. This makes sense because the harbour was part of the defence works and its shipsheds already existed in the time of Polykrates (Herodotos 3.45). Assuming that Polykrates was the builder (e.g. Shipley 1987, 75 referring to Aristotle Politeia 1313b ΠΟΛΥΚΡΑΤΙΟν ἔργα without specification) is, therefore, misleading. Instead, compare again Herodotos 3.60: he writes about “the Samians” as builders, without naming any individual person. Compare also the portrait statue of Aeakses from Samos, presumably the father of Polykrates, who was in charge of ἀπίστησι in the harbours of Samos. The statue is dated to c. 550/40 BC; see above § 3.1 with n. 51.
85 Frederiksen 2011, 10 with n. 16, 194-5 fig. 108; Grandjean 2011, 321-47 figs. 330, 335.
86 Frederiksen 2011, 125-6 fig. 16.
87 Frederiksen 2011, 168 fig. 75.
89 The Piraeus harbour is the earliest for which a chain is explicitly attested: Thukydides 2.94.4; cf. Garlan 1974, 388 with further examples and a reconstruction fig. 67.
90 Hoepfner 2000, 137-8 figs. 12-3, 144-5 fig. 26.
92 von Gerkan (1935, 113-4) envisaged a fitting for the chain, e.g. a ring somewhere at the end of a mole, close to the eastern lion, at sea level height. He doubted its permanence because the harbour would have been closed only very rarely. For the construction of an ancient closing chain, consisting of one horizontal (κλεῖθρον), and several vertical strings (ἄλυσις) to fix it to the ground, see Garlan 1974, 388 with fig. 67; Vitruvius De architectura 5.12.1 states that the chains were tightened with the help of machines, situated in towers on either side of the harbour entrance: turreae ex utraque parte conlocandas, ex quibus catenae traduci per machinas possint.
93 For the construction of harbour barriers in antiquity, see 3rd century BC author Philon of Byanzion in his Poliorketika B 31-55 with the commentary of Garlan 1974, 387-90. Tuttahs 2007, 354, referring to von Gerkan 1935, 114, considers the possibility of a temporary, fixed barrier made of earth or some organic material, without further specification.
harbours of Archaic times were at Thasos, Aegina, and probably Metymna on Lesbos.

As early as 1935 A. von Gerkan assumed that the Miletian Lion Harbour was locked off in the late Classical and Hellenistic periods with the help of a boom or an iron chain, like in the ancient war harbours of the Piraeus, or that of Rhodes (Mandraki Harbour), or the medieval Golden Horn Harbour in Byzantion-Konstantinoupolis. However, no installations for such a chain have been identified at Miletos: perhaps because systematic excavation at the harbour entrance is lacking, or perhaps because the harbour entrance was defended with the help of temporary interconnected pontoons (ζεύγματα) or ships. The latter strategy was also used by Alexander’s fleet in 334.
BC, not to defend the entrance but to block the exiting fleet of the Mileans, and to prevent the Persian ships outside from helping them.

In the late Classical period, possibly shortly after the conquest of Alexander, the two marble lions were installed at the harbour entrance; this was the same period in which the Harbour Hall was built.

Taken together, the construction of the late Classical Harbour Hall and the subsequent erection of the Harbour Monuments may have prompted the mid-1st century AD novelist Chariton of Aphrodisias to call the Lion Harbour Δοκίμου, the "Excellent". He did so in his love novel Chaireas and Kallirhoe. The fictional plot is set around 400 BC, a period in which Mileos was dominated by the Persians. The harbour is the setting for the triumphant arrival of the heroine Kallirhoe, daughter of Hermocrates, a famous Syracusan aristocrat and general, who had put down the Athenian attack on Syracuse in 413 BC. She is going to marry one of the first citizens of Mileos, Dionysios. He owns a luxurious house close to the harbour, which also served as the residence of the Persian great king, his friend (φίλος), to the harbour, which also served as the residence of the Persian great king, his friend (φίλος), to the harbour, which also served as the residence of the Persian great king, his friend (φίλος), when he stayed in Mileos. When Kallirhoe lands, the people of Mileos greet her, suggesting not only an adequate amount of space for crowds of people, but also a prestigious stage. These conditions are best fulfilled by the layout of the Lion Harbour and its surroundings.

C.P. Jones has nonetheless given a much more convincing explanation for the harbour’s name. Instead of understanding Δοκίμου in Chariton's ambiguous phrasing of the λιμένος του Δοκίμου λεγόμενον as an adjective related to λιμένος (“of the harbour that is called the ‘Excellent’”), he takes it as a personal name, ὁ λιμήν ὁ Δοκίμου λεγόμενον (“the harbour called that of Dokimos”), and argues that the Lion Harbour received its name from Dokimos, an army general of Antigones Monophthalmos. This Dokimos had restored Mileos’ autonomy and democracy in 312 BC, having taken the city by force from Asandros, another Macedonian, who had been satrap of Karia since Alexander (c. 324/23 BC). Dokimos attacked Mileos by land, while the admiral of Antigones, Medios, attacked it by sea. The final battle took place within the city around the fortified acropolis (φρουρομνύμη ἄκρα), most likely today’s Theatre Hill (Kale Tepe); it would have been necessary to renovate the nearby harbour and its facilities afterwards. Perhaps the

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95 For Hermocrates as victor over the Athenians in 413 BC, see 1.1.2; 1.2.1; 2.6.3; 5.8.8; 7.2.3; 7.5.8, 8.6.10. Anachronistically, Chariton sometimes mixed together Hellenistic and contemporary elements; Jones 1992; Tilg 2010, 39-59; Traskoma 2012.

96 Dionysios’ friendship with the Persian king, as well as his dominant role in Ionia, is stressed several times: Chaireas and Kallirhoe 1.12.6 Διονυσίου πλούσιον καὶ γένες καὶ παιδεία τῶν ἄλλων Ἰωνίων ὑπερέχουσαν, φίλον τοῦ μεγάλου βασιλέως (“Dionysios, who supersedes all other Ionians in richness, ancestry and education, friend of the great king”), 7.5.15. At 8.5.11 he even gets the honorary title "first benefactor of the royal house" (πρῶτος εὐπρεπὴς εἰς τὸν οἴκον τοῦ βασιλέως) for killing the Egyptian king, but see also 4.6.8 and 6.1.9, 11, where king Artaxerxes, according to the etiquette of the Persian court, addresses Dionysios as his “slave” (δοῦλος). Dionysios is otherwise labelled as “first of the Ionians in virtue and fame, admired by satraps, kings and cities” (2.4.4. ἀνὴρ ὁ πρῶτος τῆς Ιωνίας ἑνώκη ἄρτης της καὶ δοῦλος, ὃς θυμάζοσθαι σπανίωτα καὶ βασιλεῖς καὶ πόλεις), cf. 2.1.5; 2.5.4; 3.1.2; 4.3.4; 4.6.4; 8.7.9. Elsewhere the Persian satrap Mithridates compares him to a tyrant (4.4.4). Once (1.2.1) he is said to stem from a ‘royal’, βασιλικός house; taken together, one may suppose from this information that Dionysios belonged to one of the families of the Ionian founders, most probably the Neleidai, who also served as the Milesian “kings” (σκῆπτοῦχοι) at the common assemblies of the Ionian League in the Panionion sanctuary at Mykal Mountain: Herda 2009, 40 n. 83, 59 n. 168. The Ionian League (κοινὸν Ἰωνῶν) still existed in the time of Chariton, and into late Roman times.

97 Cf. Chaireas and Kallirhoe 1.1.13: Εἶπε δὲ ἦκον εἰς τὴν οἰκίαν, ὃ μὲν Θηρῶν ἤθωμας τὸ μέγεθος καὶ τὴν πολυτέλειαν ἀνόητος ὁ τε καὶ δοξής, τὸν δὲ θυμάζοσθαι σπανίωτα καὶ βασιλεῖς καὶ πόλεις; Chaireas and Kallirhoe 3.2.10–17. It is not clear which of Mileos’ harbours is meant by Chariton, but the Lion Harbour is undoubtedly the first candidate from the late Classical period on (cf. also Jones 1992, 101); especially as the other strong candidate, the Theatre Harbour, was no longer a closable harbour in the 4th century BC and later, cf. below § 4.1. Chariton mentions the harbours of Mileos on a number of occasions (2.4.6 τοὺς Μίλησιους λιμένας ὕπατος, “all harbours of the Mileesians”; 4.1.5 καὶ οἱ δὲ Μίλησιοι εἰπὶ λιμένας, “but beautiful are the harbours of the Mileesians”; 4.2.8 τοῖς Μίλησιοι λιμένας), but the “Harbour of Dokimos” is the only one he explicitly names. On the ancient practice of naming harbours, see Lehmann-Hartleben 1923, 289-97.

two lion statues flanking the harbour entrance stem from this rebuilding project, as well as the first building phase of the Harbour Hall. We may further suppose that the prominent so-called Heroon I, an intramural Macedonian chamber tomb located on the southeastern slope of Kale Tepe, and commanding the southern part of the Lion Harbour (Figs. 3.9, 13 & 27), is the grave of Dokimos, built by the city to honour its liberator and benefactor close to the place where he fought the decisive battle.100

The assumed phrourion on top of Kale Tepe, still in use by Byzantine times (and responsible for the later name of Miletos, Patitia-Balat (see above, n. 26), is likely to be the one built by the Persian satrap of Lydia and supreme commander (karanos) of Asia Minor, Tissaphernes, in 412/11 BC. It served as a stronghold of the Persian garrison and protected the Persian fleet stationed in the Lion Harbour in Classical times.101 This phrourion was taken by Milesian and Spartan troops shortly afterwards, in the summer of 411, when Tissaphernes started to negotiate with the Athenians in Samos. One of the Spartan allies involved in this action was Hermokrates of Syracuse; he is explicitly mentioned by Thukydides.102

One wonders if Chariton is alluding to this event when he lets his heroine Kallirhoë, the fictional daughter of this same Hermokrates, arrive in the Harbour of Doki-mos: both generals, Hermokrates and Dokimos, may have captured the same strategically important castle on top of Kale Tepe above the Lion Harbour.103

The high status of the Lion Harbour in Miletos is due to its central position within the topography of the Archaic/Classical city: with the design of the insula street grid in the 6th century BC it became a substantial part of the new city centre around the agora and the main sanctuary of the city, the Delphinion (Fig. 10).

It also played a significant role in Miletos’ foundation myth: according to one version, Apollo Delphinios swam, as a dolphin or sitting on a dolphin, from Crete via Delos to Asia Minor.104 At the place where he landed on the beach he founded a sanctuary for himself, the Delphinium, as the “holy nucleus” of the later city of Miletos (Figs. 3.6, 13 & 14). When Ionian Greeks from Athens migrated to Miletos in the early Iron Age, they brought with them a sacred flame from the hearth of the Athenian ptytaneion (city hall), which lit the sacred hearth of their own city hall.105 They installed the flame right beside Apollo’s altar in the Delphinion. It is interesting to note that both the Archaic and the later sanctuary, with its central altar, were based on the marine sediments of a former southeastern extension of the Lion Harbour embayment; it was literally erected “on the beach” of the Lion Harbour.106

99 The liberation of Miletos in 312/11 BC is explicitly mentioned in the opening lines of the second preserved list of the eponymous aisymne-isthai-stephanophori: A. Rehm in Kawerau & Rehm 1914, 258-64 no. 123.2-4: ἑπιμνήσιος Θηρῶν ἐπί τούτου ἢ πόλεως ἢ ἑλληνίδα καὶ αὐτόνομα ἐγένετο ὕπο | Ἀντίγονος ἢ δημοκρατία ἡμίκροτος (“Hippomachos, son of Theron: during whose [eponymous] office the city became free and autonomous under Antigonus, and the democracy was restored”); for the corrected absolute dating of the list cf. Herrmann 1997, 166 pl. 61; compare Diodorus Siculus 19.75.4 (Medios and Dokimos free Miletos for Antigonus “after taking by storm the fortified acropolis”); A. Rehm in Kawerau & Rehm 1914, 241 and Kleiner 1968, 17, 27, 129 have convincingly identified the mentioned acropolis (ἐφισούσαν ἡ πόλις) with the Theatre Hill. On the whole matter cf. Jones 1992; followed by: Ehrhardt 2000, 519.

100 On the grave, see Kleiner 1968, 129-31 figs. 96-8; Kleine 1980, 51-4 figs. 20-1; von Mangoldt 2012, 357-9 pl. 138, 6-8 (“B190. Milet I”). On Heroon I as the possible grave of Dokimos and his family, cf. Herda 2013, 72-76 figs. 3-5.11. Kleiner 1968, 119 saw a connection between the heroon and the phrourion, but he considered Asandros as the possible owner.


102 Thukydides 8.84-5.

103 Chariton further constructs an especially subtle example of the irony of history: Hermokrates’ admirals’ ship of 413 (cf. 3.5.3: ἐκεῖνη τὴν τριήρη τὴν στρατηγικὴν ἔχουσαν ἐπὶ τα σημεῖα τῆς νίκης, “that triere of the strategos that still carried the signs of victory”, 4.4.7: τὴν καλήν τὴν στρατηγικήν; throughout the story, the ship of Hermokrates is frequently mentioned, cf. 3.9.9-11; 3.10.8; 4.1.1; 4.3.3, etc.), with which Chaireas, the novel’s leading male character and true husband of Kallirhoë, has come to Miletos to pick up his wife, is burnt by Persian troops, stationed in a phrourion of the barbarians (“Chaireas and Kallirhoë 3.7.1: εἰς τι ὡρούσθην ἔκβολον”). This phrourion, where the Persians afterwards brought their captives to sell them as slaves to the satrap of Karia (3.7.3), is most likely the one of Tissaphernes on Kale Tepe.


105 Herodotos 1.146.

The flame of the hearth-altar in the Milesian Delphinion was sacred to the goddess Hestia. Milesian colonists departed from here under the protection of the oracle in Didyma, to found the many colonies that the Ionian metropolis was so famous for. They did so by taking with them flames from the hearth, to establish new hearths and cults of Hestia in each colony. In many cases, including at Sinope, Olbie Polis, Odessa, and Hermonassa, the cult of Apollo Delphinios was installed as well. Figuring as a dolphin-god, Apollo entered the ships together with the future colonisers. On the journey he protected them from all dangers, as Apollo Delphinios did with the Kretans in times the first step of departure for the Milesian colonists.

107 Compare his common epithets Embasios, “the one who enters (the ship)”, and Embaterios, “the one to whom are devoted the embateria rites”, as well as the opposite Ekbatereios/Ekbatereios and Epibasios/Epibaterios: Herda 2008, 33 with n. 310.


109 Bourboulis 1949, 52-69; Robertson 1987, 383. However, new studies like that of Beresford 2013 show that the idea of a "mare clausum" during winter season is a modern construct.


111 The Aeinautai, a faction of rich aristocrats (and merchants?), are an enigma of Archaic Milesian history. Their office is mentioned by Hesychios (συν. ἀειναύταις Ἀρχῆς ὀνόμα παρὰ Μυλησίους) and Plutarchos Questions Graecae 32 p. 193c-d in connection with a period of civil strife which led to the overthrow of the tyrants Thoas and Damasenor. Embaterios, “the one who enters”, is of particular importance among the secondary sources, but also of the highest political and religious value to the city state of Miletos. It incorporated the κοινὴ ἑστία, the “common hearth”, lit with the sacred flame from the hearth of Miletos’ mothercity Athens. In the Molpon the Milesian Prytaneion assembled, and diplomatic receptions (δίκη τῆς ξενίας) took place there.

We can conclude that the Lion Harbour was essential for Miletos’ past and future as a “gate for gods and people”. It was not only of strategic and commercial importance, but also of the highest political and religious value to the city.

Another important event in the Lion Harbour would have been the embateria rites, the ritual with which the seafaring season was initiated in spring every year. It was also closely connected to the cult of Apollo Delphinios, who acted as protector of the seafarers. The rite was probably integrated into the New Year festival, taking place in the Milesian month Taureon, our March–April, and devoted to Apollo Delphinios.

Did the Aeinautai, the “perpetual sailors”, attested as officers for Archaic Miletos, also depart from here; and did they perform the embateria rites?

Finally, the Lion Harbour should be considered as the place where foreign diplomatic missions, approaching by boat, landed and were officially welcomed. From here they could easily access the Delphinion, which incorporated the “Molpon”. This club house of the Molpoi, the cult association of Apollo Delphinios, served as prytaieion of the city state of Miletos. It incorporated the κοινὴ ἑστία, the “common hearth”, lit with the sacred flame from the hearth of Miletos’ mothercity Athens. In the Molpon the Milesian Prytaneion assembled, and diplomatic receptions (δίκη τῆς ξενίας) took place there.

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The prestigious outfit of the Lion Harbour as well as its usability was ruined when the Goths invaded Asia Minor around AD 262. Miletos’ city walls had to be restored, and in the course of the construction works the inner fringe of the Lion Harbour was fortified for the first time, closing the front of the Harbour Hall and dismantling the large Harbour Monument. This may be a sign that the locking of the harbour against enemies was no longer working effectively.

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During the relative peace of the centuries that followed, the defence works of Miletos were gradually demolished. However, in AD 538, in the twelfth year of Justinian’s reign, a new city wall was built, and Humei Tepe as well as the northern parts of Kale Tepe were now excluded from the fortified areas. The wall ran along the southern fringe of the Lion Harbour only, which was no longer a closable harbour. The good accessibility from the open sea made it necessary to restore the city wall from the late 7th century AD onwards, in order to defend against Arab pirates who raided the Aegean Sea.

3.2 Geophysical data (W.R. & H.S.)

Between 1993 and 2004 the area of the Lion Harbour was investigated thoroughly with different geophysical methods. The objectives of this research were (i) to search for traces of possible harbour constructions, and (ii) to determine the shape of the former harbour basin, from which further hints regarding its use and role in the more general context of city construction might be inferred.

A major result of magnetic mapping was the detection of two 50 m long, 5-10 m wide magnetic anomalies in the silted-up basin area (A and B in Figs. 16-18, 22). The anomalies are spaced 100 m apart and located close to the eastern and western harbour boundaries (Figs. 16, 18 & 22). They lead from the city centre to the two lion monuments. Geometrically, the magnetic anomalies can be thought of as forming two parallel sides of a rectangle spanning the northern part of the harbour, with the lion monuments placed at its northern corners. The relation of the suspected harbour constructions to the street system was investigated by extending the magnetic surveys from the city centre to Humei Tepe, representing the northern part of the peninsula of Miletos. These surveys, together with the micro-topography, show that part of the magnetic structures A and B found at the harbour deviate 10° from the orientation of the Hippodamian grid system (Fig. 16; see § 3.3.2).

Magnetic measurements do not provide reliable information about the depth of the causative archaeological or geological structure. The elongated anomalies A and B found in the Lion Harbour could be caused, for example, by a near surface structure with a width comparable to that of the anomalies (5 to 10 m), or by a narrow but more strongly magnetized structure at a maximum depth of 5 to 6 m. A magnetic source deeper than 5-6 m would have created a wider anomaly than that observed.

The magnetic anomalies C-F (Figs. 16, 22) are located near the modern dam that closes the bay of the Lion Harbour towards the Maeander plain. They include a weak magnetic lineament F, oriented parallel to the dam (Figs. 2 left; 3, 3; 17 background left). This anomaly shows up somewhat stronger in the west (C in Fig. 16) than in the east. Its origin has not yet been investigated. It may be caused by the modern dam, but it could also indicate anomalies of an archaeological structure, such as an assumed west–east oriented mole. Anomaly D is a strongly magnetized spot of unknown origin. Anomaly E is caused by remnants of a late Roman or Byzantine wall (Fig. 17 background right). F is related to the western Lion sculpture and the remnants of excavation work around it (Fig. 17 foreground).

In addition to the geomagnetic studies, DC-geoelectric and seismic refraction measurements (Fig. 17) were carried out in order to determine the geological boundary conditions of the harbour setting, in particular the depth contours of the basin. The northern harbour area was covered with 19 parallel seismic refraction profiles with 8 m spacing. The profiles were 144 m long with a sensor spacing of 1 m. In addition, two 3D seismic surveys were carried out on areas of 48x48 m² and 40x80 m², with 1 m grid spacing, in order to investigate the seismic basement beneath the magnetic anomalies A and B in closer detail.

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116 Tuttas 2007, 367–8 figs. 391-2; Niewöhner 2008, 108 fig. 1 green marking; Niewöhner 2009, 62 fig. 1 pink marking. The dating of the early Byzantine city wall is disputed, depending on the attribution of a Justinian building inscription of AD 538 on a lintel block to the famous Market Gate. Niewöhner (2008; 2009; 2010, 240 with n. 4-5, pp. 237-8) believes the lintel to be re-used in the gate in the 7th/8th centuries AD, when the wall could have been built against the Persian and Arab invasions into Western Asia Minor. Kästner (2009) on the contrary argues more convincingly for its original use at the gate; he therefore dates the rebuilding of the Market Gate as well as the city wall to Justinian times, AD 538 (see already von Gerkan 1935, 114–7).


The seismic measurements show that the harbour basin reaches a maximum depth of 22 m between the magnetic anomalies. The dip of the basin flanks is of the order of 30°. The seismically determined depth contours of the harbour basin were verified by drilling at many places (Tab. 2; see below, § 3.3.2).

Both the seismic and geoelectric measurements (Fig. 18) show that the western magnetic anomaly A is underlain by a rock plateau at c. 5 m depth. It is part of a ridge that closes the harbour basin towards the Maeander plain, i.e. towards the sea in ancient times. The ridge shows a 10 to 20 m wide opening, which probably represents the ancient harbour entrance. It is located c. 5 m east of the western lion monument. The geoelectric profile shows a depth section in terms of specific electric resistivity leading from the plateau into the harbour basin somewhat south of the ridge. Resistivity values of >6 Wm indicate the consolidated basement of the plateau and the harbour basin. The basin fill shows resistivity values as low as 1 Wm caused by water saturation and high porosity. The basin depths found by geoelectrics and seismics are in agreement with the limits of measurement accuracy.

Beneath the eastern magnetic anomaly B solid ground is found at a depth of 5 to 7 m. A careful tomographic investigation of this site shows that this solid ground most likely represents a debris layer overlaying soft sediments. The limestone basement is found beneath these sediments at a depth of 10 to 12 m. The eastern magnetic anomaly B follows the 10 m depth contour of the seismic basement. However, as in the case of the western magnetic anomaly A, the maximum possible depth of the causative magnetic structure is of the order of 5 m.

3.3 Data and evidence from corings (H.B., A.H. & M.M.)

3.3.1 Sediment profile at the entrance of the Lion Harbour

The coring Mil 3 was sunk into the ground at the entrance of the Lion Harbour, between the present positions of the two lion sculptures and south of a still visible later wall (E in Figs. 16‒18). It displays the typical stratigraphy of the Maeander alluvial plain. In addition, it reveals the gradual siltation of the harbour basin (Fig. 19).

Slope debris, most probably of Pleistocene age, is reached at a depth of 12.75 m bsl (below present sea level). It is topped by littoral facies with small pebbles in a sandy matrix, which are sedimentary proof of the marine transgression. With the rising water table the former beach area turned into a shallow marine embayment, as evidenced by rich marine fauna and sea grass (*Posidonia* sp.). The radiocarbon age of a specimen of the marine-brackish bivalve cockle *Cerastoderma glaucum* dates the onset of this phase to 3960-3790 cal. BC. The sediment is clayey because of the sheltered leeward position behind the Kale Tepe hill. Around 8.50 m bsl, the clay turns into silt, indicating increased sediment input from the adjacent terrain rather than higher wave energy; this had already started before the 1st century BC. The upper part of the harbour sediments (c. 2.25-0.25 m bsl) is rich in closed specimens of *Cerastoderma glaucum*, together with *Posidonia* sp., both indicating a low-energy, brackish environment. Several finds of diagnostic ceramic fragments date this stratum to the early Byzantine period. The top layer consists of alluvium from the Maeander river, continuously deposited when the river flooded the area during winter seasons before the earth dam was built in 1984/85.

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120 Woelz et al. 2009.
The chronostratigraphy of the sedimentation process, based on several ^14C age estimates and diagnostic ceramic fragments, reveals considerable morphodynamic changes. The very low sedimentation rate between 3960-3790 BC and 510-390 BC, i.e. from the Neolithic/Chalcolithic until the Archaic periods, of only 0.6 mm/a, is evidence of a still intact ecosystem with a low sediment flux in the environs of the Lion Harbour. Thereafter, the sedimentation rate increases to 6.3 mm/a between 510-390 BC and 100-50 BC, i.e. during the Classical and Hellenistic periods, which documents the mobilisation of sediments from the adjacent slopes. The highest sedimentation rate is reached in Roman and early Byzantine times: 12.2 mm/a between 100-50 BC and c. AD 400. This can be explained by the increased human impact on the ecosystem in Roman times.

In the case of the Lion Harbour another factor has to be added: in later Roman Imperial times, the Maeander delta front is close to the Milesian Peninsula, thus contributing considerably to the siltation of the harbour (Fig. 11).

3.3.2 Coring adds to the interpretation of geophysical data

Wherever possible, the best geoarchaeological approach for the study of a given area is to carry out geophysical (georadar, geoelectric, geomagnetic) research as a first step; it is the best means of acquiring areal information about the subsurface strata, including the potential occurrence of building structures, artefacts, finds, etc., relatively near the modern earth dam, erected at the entrance of the former harbour. The geoelectric profile follows the red line in the middle figure. Source: Stümpel et al. 1999, 93, and Wölz 2003, 19.

Fig. 18. Magnetic, seismic, and electric investigations of the Lion Harbour. View from southwest. Top: model of the harbour basin based on 2D and 3D refraction seismic interpretation, superimposed with a gray-scaled plot of magnetic anomalies (dark and light are positive and negative anomalies, respectively). Middle part: the bluish plain shows a depth of 6 m below today’s earth surface. The maximum depth of the harbour basin of c. 22 m was verified by drilling (Mil 101). Bottom: electrical resistivity cross-section acquired near the modern earth dam, erected at the entrance of the former harbour. The geoelectric profile follows the red line in the middle figure. Source: Stümpel et al. 1999, 93, and Wölz 2003, 19.

The same holds true for Lake Bafa, where the sedimentation rate is also highest during the Roman period. In the case of the Lion Harbour another factor has to be added: in later Roman Imperial times, the Maeander delta front is close to the Milesian Peninsula, thus contributing considerably to the siltation of the harbour (Fig. 11).

121 Brückner et al. 2006, 76-7.
123 Müllenhoff 2005, 201 fig. 52.
quickly. The processed data and any kind of anomalies have to be interpreted. The second step is to verify or falsify these interpretations. In many cases this can be done by coring, which is a relatively quick and inexpensive method, causing nearly no damage to the subterranean structures; it is a kind of “minimally invasive” archaeology. The third step is to carry out excavations – the most precise method, but also the most costly and time consuming one; in areas where the groundwater table is high, e.g. in coastal or alluvial archives, excavation is only possible with an expensive well-point system.

At the Lion Harbour, several cross-checks were carried out between geophysical and coring data. A basic question was the sediment thickness of the silted-up harbour basin. With geoelectric and seismic measurements it is relatively easy to detect the contact between hard rock (pre-Holocene bedrock) and soft rock (harbour fill). In one section of the harbour this data was compared with the results from nine corings (Fig. 20 right, Tab. 1). The refractor model and the cored bedrock depths are in good agreement, although the refractor depth is slightly underestimated in the northernmost part. The average difference between migrated

### Table 1: Coring Results at the Lion Harbour

<table>
<thead>
<tr>
<th>Core</th>
<th>Sediment Type</th>
<th>Depth (m)</th>
<th>Date</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mil 3</td>
<td>Marine bivalve</td>
<td>2370 ± 60 BP</td>
<td>100 - 50 BC</td>
<td></td>
</tr>
<tr>
<td>Mil 25</td>
<td>Marine bivalve</td>
<td>2360 ± 60 BP</td>
<td>510 - 390 BC</td>
<td></td>
</tr>
</tbody>
</table>

**Fig. 19.** Coring profile Mil 3 at the entrance of the Lion Harbour (see fig. 14). Source: modified after Brückner 1996, 571.
depths and drilling depths is 1.20 m; in reference to the drilling depths this is equivalent to an average difference of 11% (Tab. 2). The probable reason for this is that between the solid bedrock and the soft sediments of the harbour basin is an intermediate zone of weathered bedrock and (Pleistocene?) slope debris. Therefore, in some places the hardrock/softrock contact is not very sharp.

The greyscaled magnetic map (Figs. 16, 18, 20 left) shows two strong linear anomalies, A and B, running for 50 m from the present position of the lion sculptures to the southwest, at a distance of c. 100 m from each other. These anomalies were thought to be quay walls or mole foundations. However, several corings (Mil 142, 145, 171, 212) directly on these anomalies clearly reveal only...
soft sediments. Figure 21 shows a typical profile in coring Mil 145, placed directly in anomaly B: 0-0.45 m below surface (b.s.): silts, partly sandy, disturbed; 0.45-0.63 m b.s.: pieces of bricks in silty sand; 0.63-1.20 m b.s.: silty sand; 1.20-4.45 m b.s.: silt, partly clayey; 4.45-5 m b.s.: seagrass with marine bivalves and gastropods. This result is confirmed by a more recent analysis of the seismic measurements, indicating only a plateau near to 5 m in depth (see above, § 3.2, Fig. 18).125 Stone material which would be needed to construct a steady quay or a mole has not been encountered in any of the corings. How then can the anomalies be explained?

The bricks at a depth of 0.45-0.63 m b.s. are likely to be the reason for the anomalies A and B featured in the geomagnetic image, since in all of the corings the bricks are the only material that would give such a strong magnetic signal.

These brick layers miss every kind of solid foundation on the bedrock, which is at a depth of 8-11 m under anomaly B and c. 5 m under anomaly A.126 This evidence seems to indicate paved paths, which might, for instance, have provided access to the lion statues when the harbour was partly silted up. At the most, the brick layers might be foundations of rather weak walls, whose upper parts, built with bricks or stones, were later removed. They may have formed the harbour limits in the late Roman/early Byzantine periods, when the Lion Harbour had started to silt up (see below, § 3.4). This would also explain the irregularity of anomaly B, which indicates a double course in its southern part (Figs. 18, 22)127: the eastern line with its zigzag curved course in the middle part is most probably an older attempt to define the eastern harbour fringe in this area. When the siltation progressed, it was relocated further to the west.

In the context of their interpretation as quay walls or moles, anomalies A and B were formerly believed to follow the 22° clockwise inclination from geographical north of the so-called Hippodamian insula street grid system in this area.128 But this is not correct: anomaly A has only an inclination of 10° clockwise, while the course of anomaly B is difficult to determine. At least in the northern part, anomaly B shows an inclination of 10.5° clockwise. The orientation of the anomalies therefore has no direct chronological implication in the sense that

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125 Woelz & Rabbel 2005.
126 Stümpel et al. 2005, 190-1 figs. 6-7; see § 3.2.
127 Stümpel et al. 1999, 95 fig. 2, 92 fig. 4; Stümpel et al. 2005, 192 fig. 7.
128 Rabbel et al. 2006, 207.
129 This was the case until middle Byzantine times, 8th to early 11th centuries AD (K. Wulzinger in Wulzinger et al. 1935, 11, 56).
130 Stümpel et al. 1999, 95 fig. 4; Stümpel et al. 2005, 192 fig. 7; Rabbel et al. 2006, 207 fig. 3.
they were built when the Archaic-Classical grid system was still in use. Instead, the orientation is subject to the natural conditions of the harbour basin, e.g. the underground topography as detected by seismic studies (Fig. 18).

3.3.3 A new reconstruction of the Lion Harbour entrance

The new interpretation of anomalies A and B requires a review of the situation at the harbour entrance. A detailed plan of all anomalies in this area will help to solve the puzzle (Fig. 22).
First the lions: as the eastern lion (Fig. 7) stands at the northern end of the late Roman-early Byzantine anomaly B, 100 m to the southeast of the western lion, this position can hardly be original. Instead, the late Hellenistic inscription on its breast, addressing the incoming ships (see above, § 1.1), suggests an installation at the harbour entrance. A secondary placement is also likely because the sculpture of 23 tons currently stands directly on sand, without any foundation.\textsuperscript{133}

The western lion (Figs. 6, 17), in contrast, is located close to its original position, marking the terminal points of anomalies A as well as C.\textsuperscript{133} The lion later broke into two pieces, and the hind part was turned around, obviously during a futile attempt to carry it away.\textsuperscript{133}

Anomaly C could be interpreted as a quay or, more probably, a mole forming the western side of the harbour entrance. Anomaly D on the opposite side of the entrance represents a very strong but nevertheless only punctiform signal.\textsuperscript{134} Its western endpoint, which is unfortunately not very clear in the geomagnetic image (Figs. 16, 22),\textsuperscript{135} has to be taken as the approximate original position of the eastern lion. The c. 50 m broad passage between anomalies C and D transformed the harbour into a “closable” one – the κλειστὸς λιμήν mentioned in the inscription of the epistates Biare (see above, § 3.1). As the seismics have shown, anomalies C and D are situated over a ridge in the bedrock, separating the max. 22 m deep harbour basin from the open sea. The harbour entrance crossed this ridge with a max. depth of c. 8-10 m and a width of c. 30-40 m (see § 3.2, Figs. 18, 22).

The strong geomagnetic signal of anomalies C and D can be explained: between both anomalies a section of a later wall E is preserved, still visible today (Figs. 2 left, 17). It consists of stones and bricks in mortar, and forms an exact line with anomalies C and D (Figs. 16, 22).\textsuperscript{136} We may, therefore, postulate that the latter are part of this later wall, which might stand on the ancient moles.

These moles could be identical with another anomaly, running parallel under anomalies C and D and the visible wall E. This anomaly F is slightly broader and its western end is partly hidden under the modern earth dam that forms the northern limitation of the area surveyed by geophysics (Fig. 22). The anomaly is a negative one, recognisable from its grey colour, which indicates non-magnetic material like limestone, mica schist, or marble ashlar blocks – materials that were also used in the city walls of Miletos.\textsuperscript{137} Its course, following the natural ridge between the harbour basin and the open sea (Fig. 18), is as straight as that of the other anomalies A to D, but shows interruption. It does not run exactly parallel with the modern earth dam; instead its western end disappears under the dam. This can be taken as an argument that anomaly F forms its own structure, so far unrecognised.

One may assume an anthropogenetic origin, and identify this grey anomaly F with the structures of the ancient moles, closing the mouth of the Lion Harbour at

\textsuperscript{131} von Graeve 1996, 321 n. 15; contra: von Gerkan 1935, 113-4; Stümpel et al. 1995, 241; Stümpel 1999, 94; von Graeve 2000, 127; Wölz 2003, 10; Tuttahs 2007, 352. Von Graeve (1996, 321 n. 15) adds that a row of stone blocks of mica schist, marble and poros, built in header-stretcher technique, was partly uncovered, aligning the eastern backside of the lion (see in Fig. 7 the stones to the left of the lion). He could not give an explanation for this, but compared it to the construction of the harbour wall described by von Gerkan (1922, 82-3, 86-7; 1935, 110-2), and assumed that the lion had originally stood on this part of the harbour wall before it was taken down on the sand in front of the wall to move it away (see also Blum 1999, 73). In contrast, von Gerkan (1935, 113-4) reports that the lion was situated with its forepart and back, not its middle part (!), on a “postament” which he could not examine more accurately because of the high groundwater table. This contradicting information requires further investigation.\textsuperscript{132}

\textsuperscript{132} Stümpel et al. 1999, 92, 94.

\textsuperscript{133} von Graeve 1996, 321-2 with n. 15 fig. 8. On the contrary, von Gerkan (1935, 112-4) believed the western lion to be in a secondary position and the eastern lion to be in its original place (cf. also Kleine 1980, 61). He therefore reconstructed the Hellenistic harbour closure between the eastern lion and a place somewhere around the southern end of the geomagnetic anomaly A (Blum 1999, 73 fig. 24 “hell. Hafensperre (v. Gerkan)”). Blum (1999, fig. 24 “hell. Hafensperre (hypoth.)”) reconstructed the Hellenistic closure between the present positions of the lions, assuming that the eastern lion is close to its original place (followed by Tuttahs 2007, 351-2 with fig. 382). But she is astonished that the closure did not use the shorter and from a strategical point of view more suitable distance between the western lion and the western end of anomaly D (Blum 1999, fig. 24 “Variante?”).

\textsuperscript{134} W. Rabbel (personal correspondence in February 2012) assumes a heap of bricks or discarded metal.

\textsuperscript{135} Stümpel et al. 1999, 89-91 figs. 1, 2, 4.

\textsuperscript{136} Stümpel et al. 1999, 89-91 fig. 2. The in-line position of the visible wall in relation to anomalies C and D is not correctly displayed by Blum (1999, 73 fig. 24) and – based on Blum – by Tuttahs (2007, 351 fig. 382).

\textsuperscript{137} The stones that were used as building material in Miletos are limestone, poros, mica schist, and marble. They are all non-magnetic. A magnetic stone could be volcanic andesite, which is unknown in Miletos.
its narrowest part. From a strategic perspective this is the perfect place for these moles (see above, § 3.1 on the siege of Alexander), and the position of the western lion seems to support this assumption.

The (anti-)magnetic anomaly F has to be located at a maximum depth of 3 to 6 m, in accordance with the fact that it would otherwise have created a wider spreading of the signal with less clear borders (see above, § 3.2). Taking into account the fact that the bedrock at the harbour entrance is at a depth of max. 8–10 m (Figs. 18, 22), the moles are expected to have a maximum height of at least c. 10 m at their deepest point, close to the entrance. This calculation includes the current reconstruction of the sea level in Archaic times, which was c. 1 m lower than today.138 Just to give a comparison, the larger of the two Archaic moles in Samos, the one to the south of the harbour, was max. 15 m deep and at its foot 10 m broad.139

As the signal of anomaly F runs over the whole extension of the harbour entrance (c. 130–140 m), we have to expect an unbroken course of the mole in its lower part. In the middle, between the original positions of the two harbour lions, the upper layers of the masonry were presumably left out to form an easily closable gap of c. 20–30 m breadth and c. 5 m depth for the incoming ships.140

However, this reconstruction remains hypothetical and its validity has to be verified by an excavation, or at least – regarding the high groundwater table – further coring.

Finally, returning to the later wall E between anomalies C and D, we would like to add an important observation: Tuttahs notes that the visible wall is not strong enough to function as a protective barrier against floods of the Maeander or as a fortification. Nevertheless, he assumes that the wall, which he thought “clearly younger” than Byzantine, served as protection against “marauding soldateska” in the 16th and 17th centuries.141 But, as can be seen in Figure 17, the wall is at least 2 m thick and consists of reused stone and brick material, held together by mortar. This is exactly the way in which the “Gotenmauer” of c. AD 262 was built, which followed the course of the older, partly demolished Hellenistic city wall around Humei Tepe and Kale Tepe.142 Therefore, we propose to identify the late wall E as part of the Gotenmauer, which then not only surrounded the inner fringe of the Lion Harbour, but also protected its mouth, grounded on the Hellenistic moles. This perhaps also affected the lions at their terminal points, which then had to be removed. The re-installation of the eastern lion some 80 m to the southeast of its former position was not

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138 For the tectonically corrected reconstruction of the sea level curve for the Maeander delta in Archaic times, see Müllenhoff 2005, 185 fig. 47 (dotted line). Fortifications built on top of the mole would have increased its height respectively.

139 Kienast 2004, 75-6. But see above n. 75: the southern mole in Samos seems to have been c. 75 m broad in its western part.

140 Warships had a draught of max. 1.20–1.50 m, transport vessels of up to 3–4 m; information kindly provided by O. Höckmann. The width of a trireme was c. 10 m with oars. The width of the harbour entrance should therefore be at least c. 11–12 m for one or 22–24 m for two warships. See, e.g., the entrance to the war harbour of Hellenistic Rhodes, which had a width of less than 20 m, and the inner basin of the commercial harbour 13 m: Lehmann-Hartleben 1923, 129. The entrance of the port of Boeotian Larymna was 13 m wide; that of Elaia, the port of Pergamon, 45 m: Lehmann-Hartleben 1923 74.

In Roman times, with the introduction of opus caementitium, it was possible to build moles on single standing “pilae”, “pillars”, connected via arches, so that the water could constantly flow through below, preventing harbours with two entrances from silting up: Feuser 2009, 107 fig. 28, 111–3 (e.g. Alexandra Troas, Puteoli, Missenum). It remains unclear why in the case of the Lion Harbour the foundation of the mole seems to run through the whole course and is not interrupted. Was this to keep siltation out of a harbour with only one entrance, or was it due to the state-of-the-art of hydraulic engineering in Archaic times, in which the foundations of a fortified mole had to be made as steady as possible, lacking opus caementitium suitable for underwater constructions? There are several harbours detected where moles with continuing foundations are interrupted by small water channels: Feuser 2009, 113-6 (northern harbour of Mytilene, Paphos, Caesarea Maritima, northern harbour of Side). The mole of the northern harbour of Mytilene, built with hydraulic mortar, may predate Roman times: Lehmann-Hartleben 1923, 104-5 with fig. 4. For hydraulic mortar of harbour constructions, made of puzzolana, see Vitruvius De architectura 5.12.2-3.

141 Tuttahs 2007, 352.

142 von Gerkan 1935, 81-4 fgs. 47-52, p. 114-5, 126-7; Niewöhner 2008, 183-6 fgs. 1-2. Von Gerkan 1935, 82 characterises it as follows: 1.50 to 3 m thick, consisting of an outer coating built of large re-used ashlar blocks of different material, including sculptures, while the inner coating is made of careless mortar-masonry with rubble stones or sometimes also bricks. The wall is dated by coins found in the mortar of the filling, dating to the time of the emperors Gallienus (253-268 AD), Galerius (293-311 AD), Maximian (286-305 AD), and Licinius (308-324 AD). A terminus ante quem is given by a small hoard with coins of Constantin I (306-337 AD) and Theodosius I (379-395 AD) outside the wall (von Gerkan 1935, 83). Part of the “Gotenmauer” around eastern Humei Tepe, with a gate to the “Humei Tepe Harbour” (see below, § 4.3), was detected only in 2011: Bunke & Tannröver 2012, 77-8 fgs. 76, 1.5; 77-8.
an inconsiderable effort, since it weighs some 23 tons; this signals its continued symbolic worth to the city.

3.3.4 Sediment profiles at the southern fringe of the Lion Harbour embayment

A large area of the southern part of the Lion Harbour is filled with excavation debris, which reduces the opportunity for geophysical surveying. Nevertheless, seismical and geoelectrical measurements revealed the subsurface topography of the harbour basin and several sedimentary strata of the filling. In order to decipher the palaeogeographical evolution in this area, a north–south trending transect was cored (Figs. 23-4). It connects the southern harbour basin (Mil 227, Mil 8) with the area of the Harbour Hall (Mil 261) and the North Market.

All corings penetrate marine sediments above bedrock. The transgression peak can be reconstructed near coring Mil 241 (see below, Fig. 23) which shows only about 30 cm of littoral sands. According to a radiocarbon age in the upper part of this section, aggradation in this southernmost area of the Lion Harbour embayment occurred in the late Bronze Age (1413-1312 cal BC; sample Mil 241/14H, 1.00 m b.s.l.).

In Mil 227 and Mil 8, located within the southern port basin of the Lion Harbour, the transgressive unit is covered by thick shallow marine silts and sands, followed by clayey silts with reed and several cultural remains (ceramic fragments, olive stones, and grape seeds), best interpreted as coastal harbour sediments. They date from the Archaic period until late Roman Imperial times (3rd century AD; sample Mil 241/14H, 1.00 m b.s.l.).

In Mil 262, the first anthropogenic debris between 1.95-1.38 m b.s.l. delivers a 14C age of 733-406 BC (Mil 262/15 SK, 1.63-138 m b.s.l.). The layer is topped by 45 cm of sand with marine fossils and artefacts, probably piled up intentionally in order to drain the area. According to diagnostic ceramic finds, the deposits date to the 6th/5th century BC. It was not until then that this area was definitely reclaimed and consolidated by man-made infill, which served as groundings for the erection of the southern and southwestern quay and the monumental late Classical Harbour Hall (Fig. 13).

3.4 The effect of the siltation process on the uses of the harbour (A.H., H.B & M.M.)

All of the ancient harbour cities bordering the former marine embayment, such as Myous, Priene, Heralkleia, Miletos etc., lost the basis of their existence when they became landlocked due to the bypassing of the delta front. In the 2nd century AD, Pausanias describes this fate for Myous:

The Ionians who settled at Myous and Priene, they too took the cities from Karians. (…) The people of Myous left their city on account of the following accident. A small inlet (κόλπος) of the
sea used to run into their land. This inlet the river Maeander turned into a lake (λίμνη), by blocking up the entrance with mud. When the water, ceasing to be sea, became fresh, gnats in vast swarms bred in the lake until the inhabitants were forced to leave the city. They departed for Miletos, taking with them the images of the gods and their other movables; and on my visit I found nothing in Myous except a white marble temple of Dionysos.\(^{151}\)

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\(^{151}\) Translation by W.H.S. Jones.
Pausanias believed that intensive arable farming further upstream was the reason behind the rapid growth of the Maeander delta plain.\(^{152}\)

My reasoning is confirmed by the fact that the Maeander, flowing through the land of the Phrygians and Karians, which is ploughed up each year, has turned in a short time the sea between Priene and Myous into solid land.

Here he is obviously following an observation by Platon, who already dealt with the problem of soil erosion in Attica due to deforestation, thus delivering the first known accurate “geoarchaeological” explanation of this phenomenon.\(^{153}\)

As long as Miletos was not cut off from the open sea, it profited from the delta growth of the Maeander: in the late 1st century BC or early 1st century AD, a certain C. Iu-\(\tau\)t profited from the delta growth of the Maeander: in the

Step by step the westbound delta growth landlocked the former islands of Hybanda (modern Özbaş) north of Myous, and Lade (modern Batmaz Tepeleri, the “unsinkable Hills”) northwest of Miletos,\(^{155}\) and separated the Latman Gulf (\(\Lambda\upsilon\tau\mu\dot{\iota}\kappa\iota\kappa\sigma\varsigma\;\kappa\omicron\lambda\omicron\rho\omicron\kappa\omega\varsigma\)\(^{156}\) from the open sea, leading to the evolution of the still brackish Lake Baf\(\acute{\upsilon}\) (Fig. 11). Late Byzantine texts of the 13th century AD call it the “Milesian Lake”, as it originally extended from Miletos to Herakleia and Ioniapolis.\(^{157}\) The present shoreline is nearly 8 km to the west of Miletos.\(^{158}\) Many other cities along the west coast of Turkey experienced comparable landscape transformations,\(^{159}\) the most prominent examples being Ephesos\(^{160}\) and Troy.\(^{161}\)

Geoarchaeological evidence, based on many corings, shows that the delta front approached Miletos from the north in Roman Imperial times. In the following centuries, sedimentation rates in the Lion Harbour increased and shipping was more and more constricted.\(^{162}\) The harbour may have been kept free from sediments by dredging the basin from time to time,\(^{163}\) as has been assumed for

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152 Pausanias 8.2.4.11; cf. Thonemann 2011, 295-6. 306-7; for the English translation see Thonemann 2011, 306.

153 Platon, Critias 101c-112E; cf. Hughes & Thruggood 1982, 67. Rackham & Moody (1996), 18 instead believe that Platon was referring not to erosion as consequence of anthropogenic deforestation, but to Pleistocene erosion taking place in Attica 9000 years before his time. Actually Platon may be comparing both, as their effect is the same: Thommen 2009, 43-44.

154 Herrmann 1994, 122-3; Herrmann 1996, 6-7; P. Herrmann in Herrmann et al. 2006, 82-5 esp. 84 on no. 111.6-7: τὴν ἀποτομήν ἑπερατωστὰ ὑπὸ τοῦ Μιλησίου | καὶ τοῖς γηγόρασις; cf. Günther 2006, 171-7 fig. 21 Thonemann 2011, 322-5, 334.

155 In 494 BC, the island of Lade was the site of the naval battle between the Persian and the Greek-Ionian fleets, which ended in the total defeat of the Greeks and the destruction of Miletos (Herodotus 6.33-37). On Lade’s strategic role for controlling Miletos and her harbours cf. Greaves 2000a, 40, 41 fig. 3. Lade is still known as a location in a Byzantine dossier regarding the new estates of Andronikos Doukas in the Maeander valley in AD 1073. At that time a village called Galaidai was located on Lade (Thonemann 2011, 259-65 figs. 11-2). The Turkish name “Batmaz” ("that which cannot sink") originates from the name of the Byzantine monastery island Patmos, named Batnos by the Turks (see e.g. Piri Re’is, Kitab-I Bahriye, AD 1521: Thonemann 2011, 290 f., 329), which had been in possession of Lade since AD 1216, then called τὸ Πάτμιοτικό, until the Turkish conquest in the early 14th century AD (Wiegand 1929, 15). In the late 16th century, the salines around lade-Patmiotiko were property of the Ottoman state, but still kept the name of the old owner, “Batnos saltpans”: Thonemann 2011, 328 f. Nevertheless the Turkish name Batmaz Tepeleri does retain, by giving a ‘folk etymology’, a recollection of the former island (Kleiner 1968, 6), especially since Lade became an island again during the winter floods of the Maeander, before modern irrigation measures were installed after World War II (Wiegand & Schrader 1904, 12; translated into English in Thonemann 2011, 299). Thonemann (2011, 264 n. 66) instead thinks that Batmaz Tepeleri is “a toponym unparalleled in Turkey: this is simply Batnos/Patmos with a more convincingly ‘Turkic’ termination.”

156 Cf. Herda 2009, 44 n. 106, 45 fig. 3.


158 While the delta progradation has stopped, erosion of the delta front and a landward shift in the shoreline are taking place. The major reasons are the transformation of the former lower floodplain into irrigated fields in the 1950s, which led to a reduction in the water and sediment fluxes to the sea, and the rise in the global sea level.

159 Brückner et al. 2004; Brückner et al. 2006.


161 Kraft et al. 2003a; Kraft et al. 2003b.


163 Kindly remarked by O. Höckmann (letter dated 12 February 2012). The unbroken course of anomaly F, the assumed foundation of the harbour’s mole, may have prevented siltation from entering the Lion Harbour through its single entrance; see above, n. 140.

164 Höckmann 2007, 356 fig. 1.1; Feuser 2009, 115.
the Theatre Harbour (see below, § 4.1). In the Roman period, special vessels with buckets for dredging were in widespread use.\(^{164}\) The harbour of Ephesus, for example, was heavily affected by siltation from the river Cayster;\(^ {165}\) as well as by the careless dumping of waste, which led to the introduction of fines against dumping in AD 146/7.\(^ {166}\)

Several texts and inscriptions attest to the dredging of the harbour, for example in the mid-1\(^{st}\) century AD,\(^ {167}\) twice at the beginning of the 2\(^{nd}\) century AD,\(^ {168}\) in AD 129 by the emperor Hadrian,\(^ {169}\) and again in the 3\(^{rd}\) century AD, when Marcus Aurelius Artemidorus spent 20,000 denarii for cleaning the harbour.\(^ {170}\)

In the 4\(^{th}\) century AD, the river mouth of the Maeander was already located west of Miletos, between the (former) Island of Lade and the southern mainland. Nevertheless, the city could still be approached by ships via marine-brackish waters. But this was only possible with the help of hydraulic engineering: the orator Himerius (Orationes 25.73-95) testifies that the vicarius Asiae (governor of the diocese of Asia) of AD 343, Skylakios, built a "canal through the plain" (διώρυχι κατὰ τὸ πεδίον), “turned the Maeander back into a natural course” (ἡ ποταμῶν φύσις κομίζεσθαι), and “restored the harbours to the city” (ἡ πόλει δὲ ἀπέδωκας τοὺς διμένας). This implies that he at least in part dredged them.\(^ {171}\)

But the functionality of the Lion Harbour was reduced since its inner fringes, and probably also its entrance, had been fortified against the Goths c. AD 262 (see § 3.3.3). These walls may have been partly demolished in the following relatively peaceful centuries to restore the harbour’s capacity. When, however, the city wall was re-built in AD 538, the harbour as well as some of the houses and churches were situated outside the fortifications (see § 3.1).

Miletos was still an important Byzantine harbour in the 11\(^{th}\) century AD.\(^ {172}\) Since AD 1293 the city had paid tribute to the Turkish tribes controlling the Maiandros plain,\(^ {173}\) and it was finally lost to Turkish invaders of the emirate of Menteşe in the early 14\(^{th}\) century AD. After signing a treaty with the new lords in AD 1331, Venetian-Kretan merchants settled within fortified Miletos, now called “Palatia” or “Balat”\(^ {174}\) although Venice had already opened a consulate before 1331.\(^ {175}\) The emirs of Menteşe Ill acted as pirates in the eastern Aegean, with their headquarters in Ayasoluk-Selçuk, former Ephesos-Theologo.\(^ {176}\) At that time parts of the antique harbours of Palatia-Balat were still in use. In 1350 they served to gather a Turkish fleet to attack Christian Smyrna.\(^ {177}\) In 1351/52, part of the Venetian fleet spent the winter in the city.\(^ {178}\) During the same period, Palatia-Balat formed a terminal point on one of the branches of the Silk Road, traversing the Maeander Valley in the western direction.\(^ {179}\) This is well demonstrated by finds of Chinese celadon-porcelain with the typical pale jade-green glaze, and its local imitations.\(^ {180}\) But Palatia-Balat was also an important harbour for the product exchange between the Genoese and Venetians on the one side, and the emirates of Menteşe and Aydın on the other.\(^ {181}\) When the Otto-

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166 Wankel 1979, 140-3 no. 23.
167 Tacitus Annales 16.23.1.
174 On the naming, see above n. 26.
175 Zachariadou 1983, 18-20, 130-1, 137.
176 The headquarters of the Menteşe in Ayasoluk were conquered by the Ottomans in 1425: Wittek 1934, 103; Kahane & Tietze 1958, 12 f. (they give 1421 erroneously).
177 Wittek 1934, 71; Zachariadou 1983, 114.
178 P. Wittek in Wulzinger et al. 1935, 3-10.
179 P. Wittek in Wulzinger et al. 1935, 3-10.
180 P. Wittek in Wulzinger et al. 1935, 80-1; Greaves 2002, 147-8 (“Miletos-ware”). Both only mention imitations of celadon-ware, but A. Herda identified fragments of original Chinese vessels in the excavation depot (unpublished), which are comparable to the ware of the famous celadon collection of the Ottoman sultans in the Topkapı Museum in Istanbul.
181 Cf. Wittek 1934, 123 ff.; Zachariadou 1983, 261 index s.n. Palatia; Fleet 1999, 198 index s.n. Balat; Greaves 2002, 144 (Italian: soap, mastic, jewels, glass, clothes, lead, tin; Turkish: spices, tanned leather, fish, wine, grape must [pekmez], alum, grain, wax, cotton, wool, carpets, clothes, slaves). One also has to add salt, which was produced in salines at the Maeander mouth from antiquity up to the 16\(^{th}\) century AD: Thonemann 2011, 327-332.
man sultan Bayezid I conquered the region in AD 1389/90, the Venetians quickly managed to secure their commercial privileges in Palatia-Balat and Ephesos-Theologo. They did so again in 1403, when Menteșe briefly regained power after the Mongol Khan Timur had defeated Bayezid, and after 1425, when Murad II restored the Ottoman rule.

The results of our corings (e.g. Mil 3, Fig. 19; Mil 227, Figs. 23-24) point to the fact that the Lion Harbour was at least partly silted up during early Byzantine times (5th–7th centuries AD). The two 50 m long structures, detected by geophysics at the harbour entrance as anomalies A and B, may have functioned as new harbour limitations, which became necessary because of the ongoing siltation process. This assumption is reinforced by the re-installation of the ancient river lion at the northern terminal point of anomaly B (Figs. 7, 16, 22; see § 3.3.3).

K. Wulzinger and G. Tuttahs assume a harbour basin of reduced size, connected with the Maeander by a channel, until the 16th century AD. Some harbours of Miletos (see § 4), were also still functioning; one may think of the Eastern Harbour and the Humei Tepe Harbour, which were accessible from the open sea. The remaining parts of the Theatre Harbour may also be taken into account.

Balat kept its harbour function at least until the end of the 17th century AD, when the Turkish traveller Evliya Celebi visited it and witnessed qaiqs (çaïques) from Gallipoli (Dardanelles) and İstanköy (Kos), frigates from Syme and Anabolu (Nauplio), as well as ships called Zarbuna and Shaïqa, loading wheat, barley, cotton, and especially liquorice (beyân kökü). Ship-graffiti dated to the 16th – 18th/19th centuries, scratched into the wall plaster of the so-called Selçuk Bath directly south of the Delphinion, offer a lively picture of the ships heading to Palatia-Balat (Fig. 25). At that time they had to sail upstream along the Maeander River, because the siltation had cut the city off from the open sea around AD 1500. By then, the front of the southern branch of the Maeander reached the city and took its course around the peninsula. Most probably, the Eastern Harbour and the Humei Tepe Harbour were the first Milesian harbours which lost their function; otherwise they would have had to be transformed into river ports. Some scholars, therefore, postulate a larger “out-port” at the Maeander mouth some 6 km southwest of Palatia-Balat, where the bigger ships could debark. The place was called η Βίγλα, the “watch”/”look-out point” by the 19th-century Greeks. A small hill at the northern end of the large
4. The other harbours of Miletos (A.H., M.M & H.B.)

Strabon states in his Geographica (14.1.6) that the city of Miletos had four harbours (see § 3.1). The position of two of them was well known: the Lion Harbour between Kale Tepe and Humei Tepe, and the Theatre Harbour west of Kale Tepe at the foot of the Hellenistic-Roman Theatre. The positions of the third and fourth harbours have been recently detected by geoarchaeological, geophysical, and, since 2011, archaeological investigations (Fig. 10). They are located at the eastern flank of the Milesian Peninsula in a protected leeward position from the western winds (Imbat). Two other harbours of minor importance are also taken into consideration here: the so-called Athena Harbour and the Kalabak Tepe Harbour.

4.1 The Theatre Harbour

Our recent research reveals that until the early Classical period the Theatre Harbour cut much deeper into the city peninsula than has been reconstructed in Figure 10. It was created after the time of the maximum transgression in the early Bronze Age, c. 2500 BC, when the archipelago consisting of the main islands of the later Athena Temple area and the Kale/Humei Tepe was gradually connected to the mainland via sandbars (tomboli). The island around the later Athena Temple was landlocked before c. 1500 BC. While the Minoans (Miletos III‒IV, c. 1900‒1450 BC, see Tab. 1) were still able to sail through the passage between the southern limits of the archipelago and the mainland, the Mycenaeans (Miletos V‒VI, c. 1450‒1220 BC) were able to profit from the new tombol. The beaches created a perfect landing situation for ships on both sides. The area east of the new peninsula was transformed into a closable

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193 Philippson 1936, 11; Tuttahs 2007, 429-38 figs. 465-9. H. Lohmann located a Byzantine and late Byzantine settlement here (Lohmann 1995, 325 fig. 111; Günther 1999, 475 n. 2). Two small settlements and a Medieval lighthouse (“To Fanari”) are already marked in the archaeological map of Wilski 1906, B/C 5, C/6 at a place called “Kamas” (cf. Tuttahs 2007, 430 fig. 459). Th. Wiegand, A. Philippson, and G. Tuttahs believe this place to be the Karaağaç Limanı (“Ulmenhafen”) suitable for larger war ships, mentioned by the Ottoman admiral Piri Re’is in his portolan of AD 1521 (Kitab-ı Bahriye) (Wiegand 1929, 16; Philippson 1936, 11; Tuttahs 2007, 432-3 figs. 463 a-b).

194 We can only give a short overview here and will deal further with the harbours in our final publication on the geoarchaeology of the Milesian city peninsula (Herd et al. forthcoming, see above, n. 25). On the other harbours in the mainland territory of Miletos, the Milesian peninsula, as well as the Miletian islands, see Greaves 2000a, 42-6 figs. 5-7 (Panormos near Didyma, Ioniapolis in the Latmian Gulf, Teichiusa, Leros, Patmos, Pharkoussa, Lepisia, Ikarios); for the phrourion with two shipsheds on the island of Targs (Agathonisi see n. 76.

195 As for Miletos, the winds from the west were the most dangerous since the long fetch over the Aegean Sea could create much higher waves than the winds coming from the north; the latter (“Etesien”) were even favourable for sailing in ancient times. See also above n. 56.

196 Tuttahs (2007, 338-62) gives a useful overview over the Milesian harbours, though partly outdated by our recent research.

197 Cf. Müllenhoff et al. forthcoming with fig. 1.
harbour embayment, when the Kale Tepe–Humei Tepe Island became landlocked as well. This happened sometime in the Geometric or in the Early Archaic period at the latest (Fig. 26).

Until late Archaic times, the Theatre Harbour would have formed the main harbour of Miletos, as it was also the largest – even larger than the Lion Harbour. Ship-sheds for the Milesian fleet and, from 494 BC until the later 5th century BC, the Persian-Phoenician fleet, will have been located here, as the Lion Harbour alone was not big enough (see above, § 3.1). The Theatre Harbour’s opening to the sea was less protected and much more difficult to control, but the Island of Lade some 4 km to the northwest at least diminished the impact of the dangerous western winds (Imbat).198 It may not be coincidental that the only tower of the Archaic sea wall, which has been identified so far, is situated at the Theatre Harbour, east of the Hellenistic stage building.199

But the harbour’s siltation progressed rapidly: in late Classical/Hellenistic times, insulae with houses and the stadium were built on top of its fillings in the southern part, between the Athena Temple and Kale Tepe. The Baths of Faustina with the adjacent palaestra followed in the 2nd century AD.200 The dredging of the harbour area

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198 See already von Gerkan 1925, 114; von Gerkan 1935, 8; Kleiner 1968, 6, 48; Greaves 2000a, 42; 2002, 12-3. For Imbat winds see nn. 56, 195.
199 von Gerkan 1935, 91-3, 199 figs. 58-60; Tuttahs 2007, 347-8 fig. 379. For another probably Archaic tower flanking the entrance to the Lion Harbour at the NE corner of Kale Tepe see n. 82.
200 Müllenhoff et al. forthcoming with fig. 1.
in front of the theatre in Roman Imperial times was detected by corings.\textsuperscript{201} The open harbour bay seems to have remained in use until the Selçuk period, as attested by the Han (caravanserai) built southeast of the theatre, marking the endpoint of a trade-route via the Maeander valley.\textsuperscript{202}

\subsection*{4.2 The “East Harbour”\textsuperscript{203}}

The “East Harbour” was most probably located on the eastern flank of the tombolo, which connected the Kale Tepe-Humei Tepe Island with the mainland in Geometric or, at the latest, Archaic times. This harbour is therefore younger than the other two (Fig. 27.6).

Several corings (Mil 131-133, Mil 300) attest to a gentle inclination of the bedrock and the overlying shallow marine and littoral strata, as well as a smoothly domed submarine rock barrier towards the east. This situation offered perfect conditions for the landing of ships on the sheltered sandy shore in late Geometric times (c. 8th/7th century BC). From the Archaic period onwards, after the first sea wall had been erected, the harbour must have been located east of it, outside the city defences. However, the earliest building that can be connected with this harbour is the Antiochos Stoa, named after Antiochos I, who dedicated it in 299 BC.\textsuperscript{204} It was one stadion long and had 39 double rooms opening to the west (the so-called ‘South Market’), while 39 complementary single rooms, separated by a party wall, faced the city wall and the harbour to the east. They were let to merchants to pay for the construction of the Temple of Apollo at Didyma. The στοά σταδία was later incorporated into the so-called South Market and underwent different phases of rebuilding and reconstruction until the late Roman period.\textsuperscript{205} There is also a three-aisled basilica directly east of the Antiochos Stoa, dated to the later Roman period, and so far only detected by geophysical measurements.\textsuperscript{206}

Th. Wiegand and A. von Gerkan were the first to postulate a harbour east of the South Market.\textsuperscript{207} This makes perfect sense in light of the natural setting and the concentration of commercial buildings. However, archaeological evidence of it is lacking to date, with the exception of a 3\textsuperscript{rd} century AD topos inscription on the southern front of the famous Market Gate, facing the inner South Market. It mentions a ἱερὸς στόλος, a “sacred flotilla”, which seems to refer to a harbour close by.\textsuperscript{208}

\subsection*{4.3 The “Humei Tepe Harbour”\textsuperscript{209}}

The fourth harbour site has been identified at the eastern side of the former peninsula, where Humei Tepe forms a natural indentation. The site was already assumed to be a harbour by G. Kleiner.\textsuperscript{210} From 2000 to 2005, a geophysical survey was conducted which revealed the course of the sea wall with at least two gates, as well as large scale structures in the flat area surrounding the fringe of the bay to the west. They belong to harbour facilities like warehouses and probably a quay construction, located inside and outside the city wall (Fig. 16).\textsuperscript{211}

\begin{thebibliography}{9}

\bibitem{201} Brückner 1996, 574; 2003; Müllenhoff 2005, 92.
\bibitem{202} Tuttahs 2007, 415-7 figs. 445b–46, 438-40 fig. 475. Before large scale irrigation in the Maeander plain started in the 1950s, the area of the Theatre Harbour was still flooded during spring floods as, for example, in 1907. This is documented by a photograph of Getruide Bell, now in the Photographic Archive of Newcastle University: Thonemann 2011, 317 fig. 8.7.
\bibitem{203} On the naming, see n. 209.
\bibitem{204} Knackfuss 1924, 30-47 figs. 29-40 pls. 4-5; A. Rehm in Knackfuss 1924, 281 no. 193a (dedicatory inscription of Antiochos I for Apollo Didymeus on architrave of the stoa); Hiller von Gaertringen 1912, 1604; Mayer 1912, 1644; Kleiner 1968, 61-2 fig. 37; Günther 1971, 23-50; Bringmann & von Steuben 1995, 338-44 no. 281; Herrmann 1997, 199 no. 270 pl. 18, 4.
\bibitem{205} Bringmann & von Steuben 1995, 338 no. 281-9.10.
\bibitem{206} Weber 2004, 233 fig. 2, 236-8 fig. 5; Stümpel et al. 2005, 186-7 fig. 4.
\bibitem{207} Wiegand 1905, 5; von Gerkan 1935, 51, 53; cf. Tuttahs 2007, 560-2 fig. 389; Geaves 10004, 40.
\bibitem{208} A. Rehm in Herrmann 1997, 37 no. 209; see the commentary of Herrmann 1997, 202 who postulates a professional association of fishermen and compares it with the ὁ στόλος τῶν σαλαγκοκτόνων, “the flotilla of the razor shell fishermen”, in another inscription of the 5\textsuperscript{th} century AD: W. Günther in Herrmann et al. 2006, 89-90 pl. 16 no. 138.
\bibitem{209} This harbour is called the “East Harbour” (“Osthafen”) by von Graeve 2006, 261; Stümpel & Erkul 2008, 25; Burnke & Tannröver 2011, 76 with fig. 75. We prefer the designation “Humei Tepe Harbour” (cf. Tuttahs 2007, 356; “Hafenanlage am Humei Tepe”) to distinguish it from the harbour on the long stretch of the central eastern side of the peninsula around the South Market (see § 4.2).
\bibitem{210} Kleiner 1968, 8.
\bibitem{211} Stümpel et al. 2005, 184-5 fig. 2; von Graeve 2006, 261-2 fig. 10; Tuttahs 2007, 356-9; Stümpel & Erkul 2008, 25, 27 fig. 2.
\end{thebibliography}
Geoarchaeological corings (Mil 91‒93) in this area show shallow marine and littoral sediments dating to Archaic/Classical times, which are covered by anthropogenic strata. The inclination of the bedrock made the easy landing and disembarking of ships possible.212

Excavations by H. Bumke in 2011 unearthed the southern of two gates in the late Roman (c. AD 262) city wall, the so-called Gotenmauer, which was already visible in the 2003‒2005 geomagnetic images.213 In an inscribed letter of Hadrian of AD 131 found nearby, the emperor allows a corporation (οἶκος) of Milesian shipowners (ναύκλεροι) to be constituted, stressing the commercial role of the Humei Tepe Harbour.214

4.4 The “Athena Harbour”

Until the Hellenistic period, a small harbour embayment existed north of the temple of Athena (Figs. 10, 26.5); consequently it is called the “Athena Harbour”.215 In the early 20th century, the first excavators discovered an Archaic settlement with a “Harbour Smithy”, a “House of the Fisher”, distinguished by a stone anchor, and a storage room for amphorae.216

Corings demonstrate that during the period of the maximum transgression of sea level c. 2500 BC, the embayment was part of the open sea which surrounded a small island, later the site of the Hellenistic/Roman “Heroon II”.217 The fortification wall of late Bronze Age...
Miletos VI ran much further south along the Bronze Age shoreline and was restricted to an "elite-zone", encircling the former island around the later Athena Temple and the Stadium Hill, which was connected to the mainland via a tombolo before 1500 BC.218

When the Heroon II Island became connected to this peninsula in the Geometric/Archaic period at the latest, the embayment of the Athena Harbour silted up successively, though relatively slowly.219 Thus, the reconstruction of the course of the city wall between the so-called Heroon II and the Stadium Hill by A. von Gerkan has to be corrected (cf. Fig. 10, dotted lines);220 it was situated at least 40 m further to the south, framing the small harbour.

Maybe the northern wall of the Later Hellenistic “West Market” was grounded on the Classical/Hellenistic fortifications, as was the neighbouring stadium.221 The interpretation of it as a market building (“Handelsemporium”) by A. von Gerkan and others has recently been doubted because of the lack of sufficient storage facilities.222 Instead, the “West Market”, with its two 191 m long stoai on opposite sides, can be convincingly identified with a double xystos, a roofed race course of the length of one stadion, typical for a Hellenistic gymnasion.223 It may have been part of the gymnasium, king Eumenes II of Pergamon granted to Miletos before 167 BC.224

4.5 The Kalabak Tepe Harbour

An Archaic harbour was thought by V. von Graeve to exist at the northeastern foot of the settlement on Kalabak Tepe, which had been abandoned in the early Classical period (Figs. 10, 26,9).225 According to our geoarchaeological corings conducted in this area it can, however, only have had a water depth of a few decimetres, which speaks for a “beach harbour”, only used by vessels of minor draught like punted barges.226 In addition, the lack of protection against western winds would have constrained its functionality. G. Tutahs mistook the stones encountered in the corings for remains of a quay wall;227 the cultural debris and stones are best interpreted as dump material for drying up the area after the abandonment of the harbour.228

4.6 Note on the emporion, the “commercial harbour”

It remains to be discovered which one of these harbours is identical with the ἐμπόριον, the “commercial harbour”, referred to in an early Hellenistic (c. 260-220 BC) treaty between Miletos and certain Cretan cities.229 Considering the date of the inscription, the Lion and the East Harbours are the strongest candidates, since they possessed large building facilities from the late Classical (Lion

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216 von Gerkan 1925, 77-82 figs. 43-5; Kleiner 1968, 40, 48; Lang 1996, 202 fig. 74. However, according to the stands of the amphorae they should rather date to the mid-5th century BC and not the Archaic period, as I. Birzescu has pointed out to us (personal communication with A. Herda, April 2013). It is also strange that they were all found turned upside down, so that W. Schiering (1979, 90 n. 62) believed that they might represent a storage area of an amphora workshop.

217 For Heroon II, see now von Mangoldt 2012, 360-3 (“B192. Milet III”) pls. 139-40; Herda 2013, 72‒3, 76 figs. 6‒8.

218 Voigtländer 1985, 82, 85, 87 fig. 10, see above § 2. The reconstruction of Kleine 1980, 16-7 fig. 3 is outdated (no tombolo), as is the one of Greaves 2000b, 65 fig. 3.

219 Brückner et al. 2006, 70-3 fig. 3.


221 Kleiner 1968, 48-50 fig. 27.


223 This has been argued by Emme 2013, 59-65 figs. 6-8; cf. Herda 2013, 76 with n. 25. Instead, von Gerkan (1925, 104-5) explained the lack of any functional rooms in the “West Market” as an area where goods were piled in the open air; see also Hiller von Gaetringen 1932, 1609: “Der offene Hof als Aufbewahrungsort für Waren ist der Typus des hellenistischen Emporiums”.

224 The gymnasion of Eumenes II must have been located west of the Classical/Hellenistic stadium (Kleiner 1968: 89-91; Bringmann & von Steuben 1995, 346-9 no. 284 figs. 140-1). A. von Gerkan (1925, 103) has already noted that the West Market columns with filled flutes in their lower part (ibid. 103 fig. 52) are typical of the architecture of Pergamon. For a double xystos with an open court in between, one can compare the gymnasion of Ptolemy II (?) in Athens, located between the old agora northeast of the acropolis and the Roman agora, nowadays Odos Kyrrhestou (Hoeppner 1999, 224-7, fig. p. 224-5 “Strasse und Stoen nach Korres”). Other examples are the gymnasion of Hellenistic Stratoniikeia and the gymnasion of Roman Nysa; cf. Emme 2013, 62-3 fig. 8.


227 Tutahs 2007, 341.

228 Müllenhoff 2005, 90.

Harbour: Harbour Hall) and the early Hellenistic (East Harbour: Antiochos Stoa) periods, respectively.

The *emporion* housed the Milesian slave market; this is clear from the fact that the inspectors (*epimeletai*) of the *emporion* monitored the observance of the *emporion* law (νόμος ἐμπορικός), which also regulated the trade of slaves.\(^{230}\) Miletos’ slave market must have been famous in late Classical and Hellenistic times: in Chariton of Aphrodisias’ love novel *Chaireas and Kallirhoe*, the heroine is brought from Syracuse to Miletos to be sold. In the city she encounters the Persian satraps of Lydia and Karia, Pharnakes and Mithridates, who were in search of a new concubine.\(^{231}\) Taking into consideration the religious, representative, and military functions of the Lion Harbour, one tends to favour the East Harbour as the *emporion* and slave market of Miletos.\(^{232}\) This would explain why Antiochos I placed his 117-room *stoa*, which was meant to finance the temple construction in Didyma with its revenues, at the East Harbour.\(^{233}\) It is a sign of changing times that the slave Felix could be the overseer (*vilicus*, οἰκονόμος) of the Milesian tax station in the name of his master Primio and the *κοινωνοὶ τεσσαρακοστῆς λίμένων Ἀσίας*, the “company of the fortieth tax of the harbours of Asia”, in the early 1st century AD.\(^{234}\)

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\(^{230}\) The Hellenistic treaty between Miletos and Kretan cities mentions the law twice: Kawerau & Rehm 1914, 307-12; Herrmann 1997, 174-5 no. 140.49 κατὰ τὸν νόμον τὸν ἐμπορικὸν (“according to the *emporion* law”) and line 63: κατὰ τὸν νόμον τῶν τοῦ ἐμπορίου ἐπιμελητῶν (“according to the law of the *epimeletai* of the *emporion*”); see above n. 12 on the *epimeletai*.

\(^{231}\) See now Trzaskoma 2012, who stresses that Chariton in his fourth book modelled both satraps on the historical satraps Kyros and Tissaphernes, prominent in Xenophon’s *Anabasis*.

\(^{232}\) Lehmann-Hartleben 1923, 29, 147-8 favoured the Lion Harbour as the *emporion*, while Mayer 1932, 1647 thought it was the so-called West Market instead. But the West Market is probably the *palaistra* and *xystos* of the “Great Gymnasion”: see above, § 4.4 with n. 223.

\(^{233}\) On the “Antiochos Stoa”, see above, § 4.2 with n. 204. For *stoai* as the characteristic building type for an *emporion* see Lehmann-Hartleben 1923, 120-1, 147.

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